



# DG MONITOR<sup>SM</sup>

## **Interconnection Update**

This update highlights the programs and events shaping DG interconnection.

**DOE D&I R&D Annual Program Review Meeting.** The DOE's Distribution and Interconnection R&D activity held its Annual Program Review Jan. 21-23, 2003 in Arlington, VA. At the meeting, contractors reported on the status of their projects and participants discussed the activity's strategic roadmap.

The meeting opened on Tuesday, January 21 with a Welcome and Introductory Remarks from William Parks, DOE. Mr. Parks then opened the session on "Preparing for the Future." Speakers looked at the next generation grid, information exchange, and other potential changes to the energy infrastructure.

The first session Tuesday afternoon, "Exploring the Territory" included presentations on the distribution system of the future. Session two, "Investing in the

Future," took another look at the distribution system, its impact on infrastructure and issues of reliability. "Renovating the Regulatory Environment" was discussed during session three. Environmental regulation, utility regulation, and tariff structures for DER were examined.

Pat Hoffman, Deputy Program Manager, DOE Distributed Energy Electric Reliability Program, opened the Wednesday, January 22 discussion. N. Richard Friedman of the Resource Dynamics Corporation presented the *Discussion Draft Distribution and Interconnection R & D Strategic Roadmap* including the history of its development to date and key proposed R&D activities. A series of presentations followed that showed background perspectives on the draft strategic roadmap from different Stakeholders.

Participants then split up to attend pre-assigned strategic roadmap breakout (*continued on page 3*)

## **New York Fosters DG Development**

Over the last several years, the New York Public Service Commission (NYPSC) has taken several steps to encourage DG in the state. Much of this effort is based on the understanding that DG provides benefits both to users and to the local utility system. The NYPSC has developed several programs to help maintain DG as a potential resource for meeting future state energy needs. Recent efforts offer the potential to lower barriers to DG installations by tackling the issues of natural gas delivery rates and DG project financing.

On February 19<sup>th</sup>, the New York PSC provided key support for DG by requiring the state's major natural gas utilities to file special delivery rates for nonresidential customers who operate their own gas-fired DG units. This decision is meant to create natural gas delivery rates that better reflect the benefits DG provide to the system and thus makes DG installations more economical.

Once the Commission issues a written order on the rates decision, utilities will have 90 days to file DG rates. These rates will be based on DG customer usage profiles and will reflect (*continued on page 7*)

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**About the DG Monitor.** The DG Monitor is a bimonthly publication of the Resource Dynamics Corporation covering the many facets of the emerging Distributed Generation marketplace. Articles both report and interpret the most important items. In addition, the Monitor includes special series on DG technologies, applications, manufacturers, and other issues, providing the reader with a complete picture of these topics over several issues.

Comments or requests for additional information can be addressed to [DGMonitor@rdcnet.com](mailto:DGMonitor@rdcnet.com), through our website at [www.distributed-generation.com](http://www.distributed-generation.com), or by contacting Jean Connors at 703/356-1300 x 208.

Executive Editor..... Paul L. Lemar, Jr.  
 Editor..... Elizabeth A. Kime  
[ekime@rdcnet.com](mailto:ekime@rdcnet.com)

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The **Resource Dynamics Corporation (RDC)** creates business solutions that empower clients to compete effectively in changing energy markets. Often, these involve evaluating the role of new technologies. All senior staff have both business and engineering backgrounds, with a distinct focus on strategy implementation. We combine these strengths to create innovative business solutions for energy technologies and markets. **RDC** utilizes an extensive set of tools including proprietary databases and models to develop these solutions.

**We develop business solutions in four areas:**

- **Distributed Generation**
- **Marketing for Energy Businesses**
- **Strategies for Power Suppliers**
- **Strategies for Energy Purchasers**

**RDC** has entered its 23<sup>rd</sup> year. Meeting our clients' needs has always been our top priority and we have consistently delivered outstanding consulting services to enable our clients to reach their goals. Clients include energy companies, consumers, financial institutions, law firms, equipment vendors, trade associations, research organizations, government agencies and international institutions.

For more information, see [www.rdcnet.com](http://www.rdcnet.com).

**CONFERENCES**

*U.S. Dept. of Energy and the ASME International Gas Turbine Institute, Gas Turbines for a National Energy Infrastructure* ([www.asme.org/igti](http://www.asme.org/igti)) Feb 26-27, 2003, Arlington, VA

*NETL Expo: Homeland Security Technology for Our Energy Infrastructure* ([www.netl.doe.gov](http://www.netl.doe.gov)) Mar 4-5, 2003, Houston, TX

*National Hydrogen Association 14th Annual U.S. Hydrogen Conference Energy Security Through Hydrogen* ([www.HydrogenConference.org](http://www.HydrogenConference.org)) Mar 4-6, 2003, Washington, DC

*U.S. EPA, San Diego Regional Energy Office, USCHP, Solar Turbines, Inc., National CHP Turbine Technology and Regulatory Forum: Promoting Innovation* ([www.epa.gov/chp/forum.htm](http://www.epa.gov/chp/forum.htm)) March 5-6, 2003, San Diego, CA

*U.S. DOE and the Advanced Power & Energy Program, 5th Annual International Colloquium on Environmentally Preferred Power Generation* ([www.parcc.org/cepag2003/index.htm](http://www.parcc.org/cepag2003/index.htm)) Mar 18<sup>th</sup>-19<sup>th</sup>, 2003, Newport Beach, CA

*USCHPA CHP on the Move: Meeting State, Federal, and International Challenges* ([www.uschpa.org](http://www.uschpa.org)) Apr 30-May 2nd, 2003, Washington, DC

*CBI, DG Balance Your Generation Portfolio, Assure Reliability and Meet Interconnection Regulations and Standards* ([www.cbiset.com/events/PB320/index.html](http://www.cbiset.com/events/PB320/index.html)) May 12-13, 2003 San Francisco, CA

*Federal Energy Management Program DG and CHP Workshop* ([www.energetics.com/femp/la/html](http://www.energetics.com/femp/la/html)) May 13-15, 2003, Irvine, CA

**RDC DG NEWS**

“The Draft Distribution and Interconnection R&D Strategic Roadmap” – presentation by N. Richard Friedman at *U.S. DOE DEER Program Distribution and Interconnection R&D Annual Program Review*, Arlington, VA Jan. 21-23, 2003

Paul L. Lemar, Jr. will attend the *U.S. DOE & ASME International Gas Turbine Institute, Gas Turbines for a National Energy Infrastructure*, Arlington, VA, Feb 26-27, 2003

(Update, continued from page 1) discussion groups. Tracks discussed the strategic roadmap and activity missions and goals, interconnection technologies, the electrical distribution systems, and regulatory and institutional barriers. The full group re-convened on Thursday morning to discuss breakout group results. Paul L Lemar, Jr. and E.J. Honton of the Resource Dynamics Corporation presented breakout sessions results. Amongst other key points developed in these breakout discussions, participants indicated the importance of involving stakeholders in the roadmap process, of interoperability of devices and systems, and of education and standards developments.

Finally, the full group offered additional thoughts to help improve the draft strategic roadmap. The group suggested that it is important to articulate the DER vision early on. A systems view was recommended rather than a DER-dominated view, as was consideration of component compatibility with legacy systems. Participants commented on the value of the Annual Program Review, and of continuing dialogue between DOE and stakeholders in the future. Meeting materials are available online at [www.eere.energy.gov/distributedpower/02annualreview.html](http://www.eere.energy.gov/distributedpower/02annualreview.html).

**FERC ANOPR.** At the time of the last Update, the Federal Energy Regulatory Commission (FERC) had extended the deadline for stakeholders to file statements on the consensus documents for the Standardization of Small Generator Interconnection Agreements and Procedures Advance Notice of Proposed Rulemaking (ANOPR). Since then, FERC has announced a change of plans.

The FERC standard is meant to expedite interconnection and make it less costly, but developing such a standard through a process of stakeholder consensus building has proven difficult. At the January 22-24, 2003 DOE Distribution and Interconnection R&D activity Annual Program Review, FERC Chairman Pat Wood gave the keynote speech on the topic "Innovation, Energy Infrastructure, and DER." In his speech, he noted finding points of consensus amongst stakeholders in the ANOPR process did not go as smoothly as was hoped. As a result, FERC staff has taken up the task of drafting a recommended consensus document.

In drafting the document, FERC staff will take into account the issues raised by participants during the ANOPR process. FERC expects to have the

document ready for comment some time in the next several months.

**IEEE P1547.1, .2 and .3 Status Report.** On Jan. 23<sup>rd</sup> and 24<sup>th</sup>, the Work Groups for IEEE P1547.1, P1547.2 and P1547.3 met in Arlington, VA. At the meeting, which followed the aforementioned Annual Program Review, the status of IEEE P1547 Draft Standard was discussed. P1547 Draft 11 has been recirculated to the ballot group with unresolved negative ballot comments from the last vote. If the group once again approves the draft, it will be submitted to the IEEE Standards Board and with their approval, will be published.

The meeting then progressed with separate meetings of the IEEE P1547-complementary standards development projects:

- P1547.1-Draft Standard for Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems;
- P1547.2-Draft Application Guide for IEEE Standard 1547 for Interconnecting Distributed Resources with Electric Power Systems; and
- P1547.3-Draft Guide for Monitoring, Information Exchange and Control of Distributed Resources Interconnected with Electric Power Systems.

P1547.1 met Thursday, January 23<sup>rd</sup> in the afternoon. This standard will, when completed, specify the type, production, and commissioning tests that must be performed to demonstrate DR interconnection functions and equipment conformance to IEEE P1547. At this meeting, the Work Group worked to develop an explanation of the current draft tests.

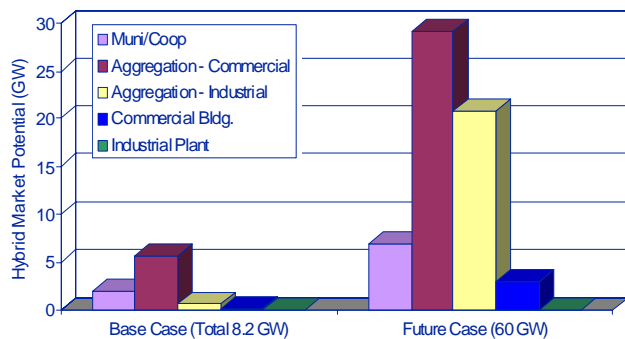
The P1547.2 Work Group, chaired by RDC CEO N. Richard Friedman, met Friday morning, January 24<sup>th</sup>. This guide is meant to provide technical background and application details to help readers understand IEEE P1547. The Work Group focused on discussing and refining a Resource Document from which P1547.2 Draft 1 will be created.

P1547.3 met on Friday afternoon January 24<sup>th</sup>. The Group worked to produce an outline for the Draft Guide, gathering resource documents, and completing writing assignments. At the conclusion of the meetings, the next meeting of the P1547.1 and P1547.2 and P1547.3 work groups was tentatively scheduled for June 2003. ■

**TECHNOLOGY SERIES: FUEL CELL HYBRIDS PART 2. ECONOMICS**

Fuel cell hybrids can potentially offer the most competitive option for low cost power in many areas of the country. Their superior efficiency, competitive installed cost, and very low emissions make them suitable for several application, and as installed cost falls in the future, hybrids will potentially gain significant market share and become options for other applications as well.

In a newly published report entitled *Fuel Cell Hybrids: Market Assessment and Early Adopter Study*, prepared by the Resource Dynamics Corporation for EPRI, Rolls-Royce Allison and the U.S. Department of Energy, hybrid market potential and development are examined. As shown in Figure 1, hybrid’s superior efficiency, competitive installed cost, and very low emissions help hybrid amass over 8 GW of potential in the near future.



**Figure 1. Hybrid Market Potential by Application (GW)**

The base case potential (around year 2005) is based upon hybrids becoming available in sizes from 300 kW up to 40 MW, with installed cost ranging from \$1,100 to \$1,600 per kW, and electrical efficiencies from 63-70 percent. A future case (anticipated by 2006-2009), was also examined in which installed costs are expected to drop down to \$600-\$1,100/kW and electrical efficiencies are expected to rise as high as 74 percent. With these improvements, fuel cell hybrids offer an expanded market potential of 60 GW.

Commercial aggregations (groups of buildings served by a single, large DG unit) lead all the scenarios in market potential. Long-term future cost reductions allow hybrids to make inroads in the single building market, with 12 GW of market potential. Offices are the leading single building type, primarily due to the large numbers of buildings paying high retail electric

rates. Industrial aggregations will fare considerably better with future cost reductions but, even so, the market for industrial facilities never reaches above 1 percent of the total hybrid market.

To determine the hybrid’s potential in the U.S. commercial and industrial sectors, this analysis determined whether on-site generation is more cost effective than purchasing from the grid. Competing DG technologies considered included reciprocating engines, gas turbines, the Advanced Turbine System (ATS), and a non-hybrid fuel cell. The study focus was on continuous power and combined heat and power applications as this represents the most likely markets for the hybrid technology.

The market estimates suggest that of the hybrids examined (300 kW, 1.5 MW, 10 MW, 20 MW and 40 MW size ranges), hybrids of sizes 15 MW, 25 MW and 40 MW have the most potential (see Figure ES-2). These larger sizes can economically serve groups of customers, such as those served by municipal or cooperative electric systems, or by independent aggregators. In most of the cases shown in Figure ES-2, the primary competition for hybrids is gas turbines.

Various sensitivity analyses were performed for this study. It emerged that largest single contributor to increased market potential is improvement in the installed cost of hybrids. By meeting the \$400/kW manufactured cost target that has been established by DOE’s Solid State Energy Conversion Alliance (SECA), hybrid packaged prices reach \$470-500/kW and installed costs drop to \$570-800/kW. At these lower costs, fuel cell hybrid market potential grows to almost 90 GW.

Three specific conclusions arise from the analyses:

- 1. Pursue Aggregations for Near Term Markets.** Given the higher installed cost of near-term fuel cell hybrids, aggregation and a power delivery arrangement are required for a significant market to emerge. However, aggregators will only be successful if they have access to unbundled distribution tariffs and reasonable interconnection costs to the local T&D system. The analyses estimate that in these aggregation markets, hybrids have a \$5 billion potential for net savings (*continued on page 6*)

**Recent RDC Reports**

The following are examples of recent RDC reports. These reports are categorized below by sponsoring RDC client.

**US DOE**

**Small Community Case Study.** A macro level business case assessment for an advanced distributed resource (DR) technology, fuel cells using technologies developed under the Solid State Energy Conversion Alliance (SECA) program, was developed. An analysis of the grid-competitiveness of these fuel cells was performed for the facilities located within a small community.

**EPRI**

**Strategic Intelligence on Distributed Resources Market Developments - Impact of High Gas Prices.** This report analyzed how varying natural gas prices impact the potential distributed generation market.

**Screening Tool for Distributed Resources Applications.** A spreadsheet tool was developed to analyze the use of distributed generation in place on conventional transmission and distribution upgrades.

**Distributed Resources - Combined Heat and Power.** This project examined commercial and industrial sector heating loads to determine the market potential for CHP units, addressed the coincidence of thermal and electric loads, examined the market structure and product shipments in the water heater and boiler industries, and addressed possible utility roles in these markets.

**Distributed Resources Deployment Review - Utility Distributed Resources Programs.** This project determined the extent to which utilities are offering interruptible rate schedules, identified the terms of the rate schedules of companies that offer interruptible rates and compared them to the otherwise applicable rates, and surveyed electric utilities with interruptible rate schedules to learn more about their interruptible rate programs and the extent of distributed generation involvement.

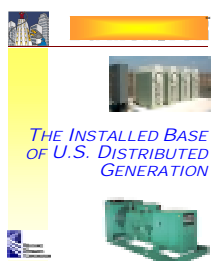
**Business Models for Distributed Resources.** Utilities need a plan and rationale that they can use, as well as present to regulators and customers, to

explain their position on distributed generation. This report provides utility strategic planners with essential components of a strategic plan for addressing distributed resources, including when and how utilities should encourage or discourage distributed generation. Utility strategic planners can adopt and tailor these components to fit their own circumstances.

**Turbine Manufacturer**

**Combustion Turbine Market Assessment.** This project assessed the U.S. market potential for microturbines and a family of small industrial turbines (both recuperated and non-recuperated). These turbines were compared with reciprocating engines and the grid. Different sizing scenarios were examined to maximize overall market potential. Various sensitivity analyses were performed, giving key information on which price and performance parameters had a major impact on the market potential. ■

**DG Monitor Publications**



Need to know how many DG units there are? Previously unavailable baseline information including the total number of units, capacities, generation and thermal output by 19 size ranges are available in the **DG Monitor of U.S. Distributed Generation**. Breakouts by technology, by application, by primary fuel consumed and by year of installation will help decision-makers at all levels!

With the new IEEE 1547 DG Interconnection Standard likely to be released this year, the **DG Monitor's Directory of Interconnection Technologies and Equipment** helps decision-makers quickly develop a short list of potential interconnection solutions. This publication lists the equipment and technologies necessary to interconnect all kinds of DG applications, and provides contact information for manufacturers and distributors.

Evaluating DG technologies or markets? Check out the **DG Monitor's 2002 DG Sourcebook!** A compendium of information on virtually every aspect of distributed generation technologies, applications, and markets - right at your fingertips!

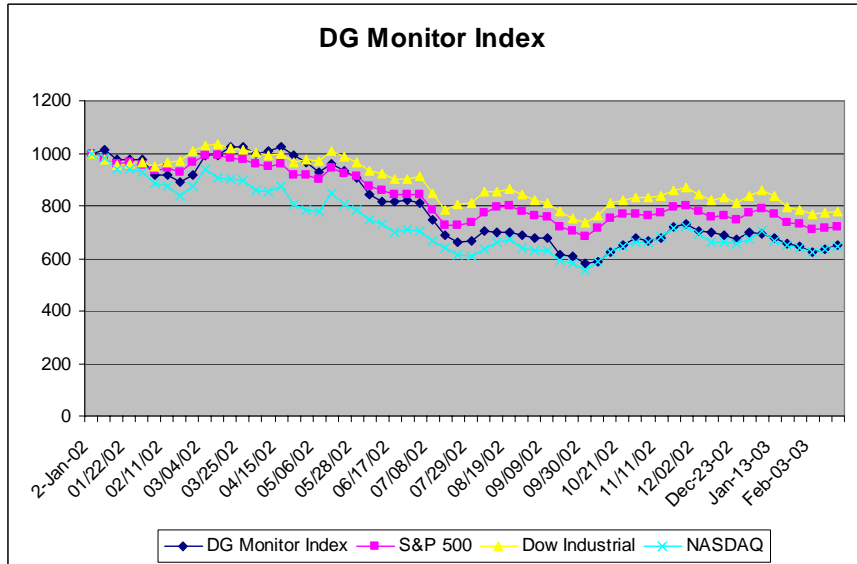
To order these report, go to <http://www.distributed-generation.com/> and follow the links.

**The DG Monitor Index<sup>SM</sup>**

The DG Monitor Index<sup>SM</sup> continues to lag the Dow Jones Industrials and the S&P 500, but has pulled slightly ahead of the NASDAQ.

Top-performers since January 2002 include DTE Energy, American Power Corporation, United Technologies Corporation, and Williams Energy.

The poorest performers have been emerging technology manufacturers. Those weighing on the index include Capstone, Active Power, Astropower, and Ballard.



Companies included in the DG Monitor Index<sup>SM</sup> include: Active Power (ACPW); American Power Conversion (APCC); AstroPower Incorporated (APWR); Ballard Power Systems (BLDP); Capstone Turbine (CPST); Caterpillar Incorporated (CAT); Cummins Incorporated (CUM); DTE Energy (DTE); Duke Energy Corp (DKE); Emerson Electric (EMR); PlugPower Incorporated (PLUG); Spire Corporation (SPIR); United Technologies (UTX); Williams Energy (WEG); Woodward Governor Company (WGOV). ■

(Fuel Cell Hybrids, continued from page 4) in the base case – rising significantly toward \$30 billion in the future case.

**2. Emphasize Hybrids in Areas Where Siting is Difficult.** Hybrids can offer added value in emission and/or T&D constrained or high-price areas. This includes non-attainment areas where hybrids would not require additional capital cost (unlike other DG options such as engines or turbines) to add-on emission control equipment

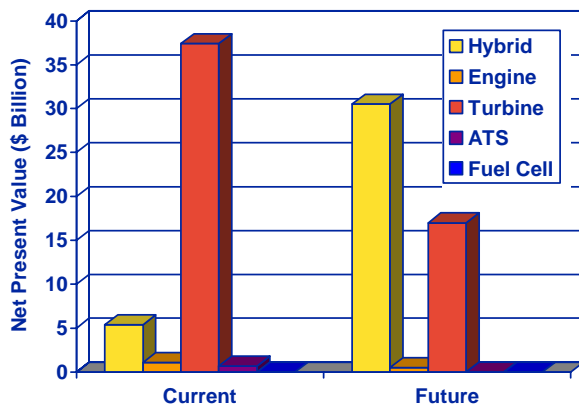


Figure 2. Value of Hybrid Market Potential (Billion \$)

**3. Continue R&D to Reduce Costs of Fuel Cell Hybrids.** If the long-term installed capital cost and

efficiency goals are achieved, then improved smaller hybrids could be competitive in the single facility market. *Attaining competitive installed cost is critical to the hybrid's success, with installed costs of \$900-1,000/kW necessary to reach the single facility market.*

For more information and a deeper look at this topic, a copy of the *Fuel Cell Hybrids: Market Assessment and Early Adapter Study* will be available at [www.distributed-generation.com](http://www.distributed-generation.com) in the next several weeks.

DG market assessments like the *Hybrids* report provide the market intelligence essential for success in the DG market. RDC reports:

- estimate the DG market in the region of interest;
- evaluate the technical and economic feasibility of serving different customers with DG and determine with DG applications, technologies and sizes can provide solutions; and
- identify specific high value customer groups.

For more information on RDC's DG market assessment capabilities, please contact Paul Lemar at (703) 356-1300 ext 204, [pll@rdcnet.com](mailto:pll@rdcnet.com). ■

(*New York, continued from page 1*) the costs and circumstances unique to each utility. These rates will be in place for three years, at which time adjustments may be made based on information about DG customer natural gas usage gained during this period. The Commission has approved a protocol to be used by the utilities to collect this information for use in the formation of future rates.

While this decision focuses on non-residential customers, residential customer rates will be considered by the Commission. Currently the Commission is welcoming comments on the development of residential rates, with the goal of having these rates in place by January 1, 2004.

Also recently, the Commission took action on a National Fuel Gas Distribution Company (NFG)-proposed "Partnership for Distributed Generation" pilot program. The program proposal, originally filed by NFG in June of 2002 and supported by the Buffalo-Niagara Partnership and the Erie County Department of Environment and Planning, was

approved by the Commission with modifications. The three-year pilot program is meant to encourage DG by providing funding to customers served by NFG for the installation of DG equipment.

NFG will provide up to \$3 million in loans over the next three years to DG customers. It is anticipated that approximately 30 projects will be financed through the pilot program, which will serve a secondary project-development information collection purpose. The Commission hopes that the program will promote DG in the state, and that other gas utilities will be encouraged to pursue pilot programs of their own.

These Commission actions should help lower costs for DG installations and provide important data on the installation process. For more information on these Cases and other Commission activities, go to <http://www.dps.state.ny.us>. For information on RDC services related to interconnection, please contact CEO N. Richard Friedman at (703) 356-1300 ext 203, or [nrf@rdcnet.com](mailto:nrf@rdcnet.com). ■

### ***Ask the DG Monitor***

The new column responds to reader's questions about the DG market and DG technologies. Do you have a question for the Monitor? Email: [askthemonitor@rdcnet.com](mailto:askthemonitor@rdcnet.com).

#### ***Reader Question:***

I'm currently conducting some secondary research around the distributed generation market. I was recently reviewing a past copy of your DG Monitor (Vol. II, Issue 2, March 2002) and noted a quoted projection that the DG market could grow to as much as \$5-10 billion in the U.S. market. By what year does that projection relate to? Are there other public resources available that attempt to size this market, with associated assumptions?

– JK, January 28, 2003.

#### ***DG Monitor Answer:***

Our estimate is based on the actual sales of DG units of various sizes and technologies during recent years. We multiply DG capacity by typical \$/kW installed costs to arrive at the size of the current U.S. market after calculating the number of kW's sold. Based upon recent sales, anticipated improvements in DG technology, and the market applications where DG is economical, we estimate that the market will grow to around \$5-10 billion per year by 2010. The breadth of this range is testament to the forecast uncertainty. DOE's Distributed Power Program, the California Energy Commission, NYSEERDA, the Gas Technology Institute and similar agencies have also attempted to measure market size, with quite a range of results. Recognizing all this, the Resource Dynamics Corporation plans to build upon its recently released *DG Monitor's 2003 Installed Base of U.S. Distributed Generation* report and produce a careful analysis of the market potential for DG under alternative scenarios. This will be available later in 2003. JK, we hope this helps. Good luck in your research.

–The DG Monitor Staff

## DG NOTES

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*Feb 19, 2003* - **FuelCell Energy Inc.** received notice from the California Energy Commission that its DFC300A Direct FuelCell® power plant is certified for grid interconnection under California's "Rule 21" standard. The company will be pursuing certification for its DFC1500 and DFC3000 products later this year. Rule 21 certification enhances the eligibility of the DFC products for state incentive programs, such as the California Public Utility Commission's Self Generation Program and the CEC's Emerging Renewables Buydown Program. Both offer subsidies of up to \$4,500/kW or 50 percent (whichever is less) for fuel cell projects that utilize renewable fuels. The CEC's program also offers subsidies of \$2,500/kW or 40 percent of total project cost (whichever is less) for combined heat and power fuel cell projects that operate on natural gas.

*Feb 13, 2003* - **STM Power** completed its beta product assembly and is now field-testing 50 external combustion, 2.5 kWe Stirling-cycle PowerUnits. These PowerUnits will be commercially available in configurations from 55 kWe to multiple MW for delivery starting in July 2003. Each 2003 model PowerUnit produces 55 kWe of 480-volt AC electric power and 10 gallons of hot water per minute at a 72 degree rise in water temperature. Initial marketing will focus on installations at landfills, wastewater treatment plants and agricultural digesters, with follow up marketing to police and fire stations, hospitals and schools in conjunction with the infrastructure needs.

*Feb 6, 2003* - Natural food processor California Natural Products will use its new on-site CHP system, featuring **Encorp Inc.** technology and a 1350kW **Deutz** natural-gas engine, to supplement power from Pacific Gas & Electric and provide back-up power for specific critical loads. The power system's excess heat will be used for the manufacturing process.

*Jan 30, 2003* - **EBARA BALLARD's** first generation pre-commercial 1 kW stationary CHP PEM fuel cell generator was unveiled for Japanese residential market. The system includes a Ballard fuel cell, EBARA Corporation pumps and blowers, a

reformer based on technology licensed from Tokyo Gas, and a hot water storage tank. The system operates with total system efficiency (heat and electricity) of 92 percent.

*Jan 29, 2003* - **Geveke Oil & Gas** received follow-up orders a system based on four **Capstone** Capstone60 units and one **Caterpillar** D3406 diesel genset from Clyde Petroleum's new offshore platform and an order for one Capstone30 unit which will become the new prime power source for the offshore platform P18A of BP Nederland Energie.

*Jan 16, 2003* - PV systems were installed on four BJ's Wholesale Clubs through a partnership between Conservation Services Group, **Evergreen Solar, Inc.**, BJ's, and the Long Island Power Authority solar rebate program. The arrays feature 96 Evergreen Solar photovoltaic panels, and combined will generate between 40,000 and 50,000 kWh of electricity yearly.

*Jan 2003* - **Hydrogenics Corporation** delivered a regenerative fuel cell auxiliary power unit developed under contract by the U.S. Army Tank-automotive and Armaments Command for deployment and testing on army vehicle platforms. The PEM electrolyzer module, by recharging the hydrogen supply while the vehicle engine is operating, provides sufficient fuel to operate the fuel cell auxiliary power system for up to five hours with a load of 3 kW average, and peak demand of 5 kW.

*Jan 2003* - The **California Air Resources Board** issued the first Executive Order of Certification for the Distributed Generation Certification Program to the **United Technologies Corporation** 200 kW phosphoric acid fuel cell. To view the EO, go to [www.arb.ca.gov/energy/dg/dg.htm](http://www.arb.ca.gov/energy/dg/dg.htm)

*Dec 11, 2002* - **Encorp** new Energy Management Center communication and control service helps ensure that DG assets used for standby, peak shaving, or co-generation applications run at peak efficiency by immediately notifying operators if a problem arises or when scheduled maintenance is needed at a specific site.