



Distributed Generation

MONITOR

FERC ANOPR Gains Momentum

Following up on its Advance Notice of Proposed Rulemaking (ANOPR), the Federal Energy Regulatory Commission (FERC) held the first public meeting Monday and Tuesday September 10-11th, 2002 to discuss expedited and more affordable interconnection of small generators under FERC standards. Monday's session began with a brief opening statement by FERC Chairman Wood, followed by initial discussion of meeting procedures.

A group discussion followed during which market stakeholders presented their views and concerns on issues that included jurisdiction, who is responsible for paying for studies; the generator or the utility, and size range/limitations. Suggestions for size caps were as low as 10 MW and as high as 30 MW, illustrating the division between transmission owners and DG manufacturers. In addition to these issues, the actual ANOPR approach was also debated.

"Pulling the Plug" on the Standard Market Design

In a notice sent out Oct. 2, 2002 by the U.S. Combined Heat and Power Association (USCHPA), it was announced that the FERC Standard Market Design rulemaking proposal may be in jeopardy. The announcement stated that the Senate Energy Conference staff, in an effort to reconcile provisions on electricity with the House, has presented a proposal that includes a provision to vacate the FERC rulemaking. The consequences of this provision on the DG market, both if it is adopted into law and as a sign of Congressional sentiment, could be significant. The DG Monitor will continue to keep an eye on this situation and inform its readers of potential outcomes.

Proposals for the process included suggestions to identify the similarities between state interconnection documents and work from there in designing the FERC document. Other suggestions included progressing in a topic-by-topic fashion, and starting with the National Association of Regulatory Utility Commissioners (NARUC) "Adopted Interconnection Guidelines".

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IEEE DG Interconnection Standard Approved

After over two years of development, the Institute of Electrical and Electronics Engineers, Inc. (IEEE) announced that *IEEE P1547 Standard for Distributed Resources Interconnected with Electric Power Systems* has been approved by the balloting group with 90% affirmatives. Voting on the most recent version of the Standard, IEEE P1547 Draft 10, closed September 26, 2002.

This news has important consequences for the DG marketplace. As Dick DeBlasio of the National

Renewable Energy Laboratory (NREL), Chairman of IEEE SCC21 and of the IEEE 1547 Working Group, said "[t]his marks a major milestone toward IEEE publication of a body of standards for DR interconnection. The passage of IEEE 1547 has helped reinvigorate our hard-working committee by establishing the foundation for a series of complementary IEEE standards development projects." A final IEEE 1547 Standard will be developed based on ballot comments and then submitted to the IEEE

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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, through our website at www.distributed-generation.com, or by contacting Jean Connors at 703/356-1300 x 208.

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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 23rd 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.

(*IEEE P1547, Continued from page 1*) Standards Board. With their approval, the standard will be published as an American National Standards Institute (ANSI)/IEEE consensus standard, and will document the minimum functional technical requirements for DG interconnection to the electric power system and for the performance, operation, testing, safety considerations, and maintenance of the interconnection. Additional IEEE SCC21 DR activities will build on IEEE 1547 in the development of complementary IEEE 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.

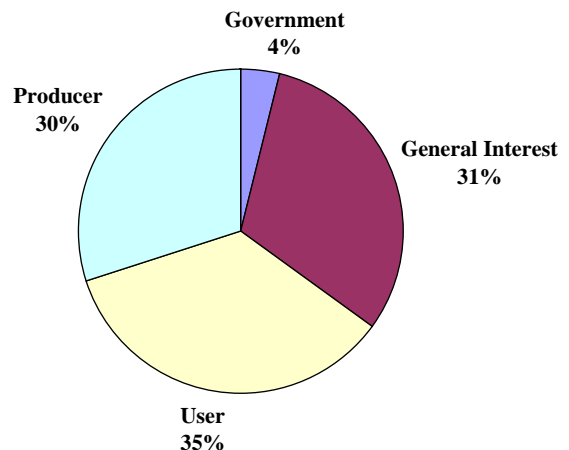
N. Richard Friedman of the Resource Dynamics Corporation, who led the development of the IEEE 1547 technical requirements for interconnection, is leading the IEEE P1547.2 Work Group, which was formed to draft the Applications Guide.

P1547 Balloting Statistics

93% of the 230 ballots that were sent out were returned.

There were 187 affirmative and 20 negative balloters and 7 abstentions.

P 1547 Respondent Demographics



DG Acronym Anagrams

Many new terms and acronyms that describe DG equipment are entering into common usage. The problem is, when you see a term used, you cannot be sure what the author actually includes in *his definition*. The following questions need to be answered to clarify this point:

- What is the size range (e.g., less than 20 MW)?
- Does the system have to be interconnected to the grid?
- Does emergency power, which is only used a few hour during the year, count?
- Are units used solely for grid support counted? (they are not located close to the load being served)
- Which generation technologies are being included? (e.g. are renewables included?)

The following summarizes some of these terms and their acronyms and definitions, grouped by topic.

Distributed Energy Resources (DER). Two definitions, one from the U.S. Department of Energy (U.S. DOE) and one from the California Energy Commission (CEC), are shown below:

U.S. DOE - A variety of small, modular power-generating technologies that can be combined with energy management and storage systems and used to improve the operation of the electricity delivery system, whether or not those technologies are connected to an electricity grid.

CEC - Parallel and stand-alone electric generation units located within the electric distribution system at or near the end user. DER can be beneficial to both electricity consumers and, if the integration is properly engineered, the energy utility.

The DOE definition is the broadest of all the definitions listed in this article. Interestingly, the CEC definition does not include energy storage, which usually is included by other organizations when the term “resources” is used.

Distributed Resources (DR). Two definitions, one from the Electric Power Research Institute (EPRI) and one from the Institute of Electrical and

Electronics Engineers (IEEE), are shown below:

EPRI - Small (less than 50 MW) electricity generation, storage, or demand side management technologies.

IEEE - Sources of electric power that are not directly connected to a bulk power transmission system. DR includes both generators and energy storage technologies

Distributed Generation (DG). Small-scale electric generation located close to the load being served.

Distributed Power (DP). See distributed generation. This term was most commonly used by the Distributed Power Coalition of America (DPCA).

Dispersed Generation (DG). Smaller power plants connected to a **distribution network** (as opposed to the high voltage transmission network). More commonly used in English speaking countries outside North America.

Embedded Generation (EG). See Dispersed Generation.

On-Site Power. Electric generating capacity located at the site of the load being served.

Combined Heating and Power (CHP). A system that recovers waste heat when electricity is generated and uses it to create high temperature hot water or steam. Steam or hot water can then be used for space heating, producing domestic hot water, or powering dehumidifiers and water chillers for air conditioning.

Cogeneration (Cogen). See combined heating and power, although cogeneration is usually used to described larger systems.

Combined Cooling, Heating and Power (CCHP). A generating facility that produces electricity and another form of useful thermal energy (such as heat or steam) used for heating and cooling purposes, typically using a thermally-driven cooling technology, such as an absorption chiller.

Building Combined Heating and Power (BCHP). CHP used in commercial or institutional buildings.

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(DG Acronyms, Continued from page 3)

Integrated Energy System (IES). An integrated energy system that recovers waste heat from on-site or near-site power generation to provide hot water, steam, heating, cooling, or dehumidifying air for buildings. Term is most commonly used by the U.S. DOE.

Qualified Facility (QF). A generation facility owned or operated by a corporation that is not primarily engaged in the generation or sale of electric power. QFs are either renewable power production or cogeneration facilities that qualify under Section 201 of the Public Utility Regulatory Policy Act (PURPA). Under PURPA, QFs are allowed to sell their electric output to the local utility at avoided cost rates. To become a QF, the independent power supplier has to produce electricity by cogeneration or with a renewable fuel source, and meet certain ownership, size, and efficiency criteria established by the Federal Energy Regulatory Commission (FERC).

Renewable Energy. Energy from natural sources that can be replaced as they are used or within a very limited time frame. Renewable energy sources include flowing water, wind, biomass, the sun, and geothermal sources.

Green Power. Power generated with renewable energy, although sometimes power from fuel cells is included in this definition.

Emergency Power. An independent system that automatically provides electricity within a specified time frame to replace the normal source if it fails. The system is used to power critical devices whose failure would result in property damage and/or threatened health and safety.

Stand-by Power. An independent system that provides electricity to replace the normal source if it fails. The power provided will allow the customer's facility to continue to operate satisfactorily.

Backup Power. Emergency or stand-by power. Sometimes provided (for a fee) by the local utility.

Premium Power. Uninterrupted power, intended to be free of frequency variations, voltage transients, dips, and surges. Power of this quality is not available directly from the grid – it requires both auxiliary power conditioning equipment and either emergency or standby power. Alternatively, a DG technology can be used as the primary power source and the grid can be used as a backup.

Remote Power. Onsite power used for an application that is not connected to the local grid.

The most commonly used term by industry is distributed generation. Unless otherwise defined, the DG Monitor defines distributed generation as: Electric generating units less than 20 MW that are located close to the primary load being served or are being used to provide grid support. ■

CONFERENCES

CADER & USCHPA Networking DG – Connectivity & Market Access (www.cader.org) Nov. 11-12, 2002 San Diego, CA

3rd Annual National CHP Roadmap Workshop, CHP and DER for Federal Facilities, EPA CHP Partnership Meeting (www.energetics.com/femp-chpworkshop.html) Oct. 23-25, 2002 Boston, MA

IEEE P1547, Standard for Distributed Generation Interconnection, Writing Group (www.ieee.org) Oct 8-11 2002, San Francisco, CA

P1547.1, P1547.2, P1547.3 Interconnection Work Groups (www.ieee.org) Oct 8-10 2002, San Francisco, CA

Check out the *new Interconnection section* in the RDC DG Library, which contains presentations and case studies on this hot topic.

www.distributed-generation.com/library.htm

(ANOPR, Continued from page 1)

After the discussion, the group was divided by the FERC staff into three caucuses: Small Generators, Transmission Owners, and NARUC/States which met separately to discuss and form their platforms.

When the groups reconvened, the Transmission Owners group presented first, and began by defining their suggestion for the working groups. They indicated that eight principal negotiators from each group should head the process at each meeting. After a question from the Small Generator group, the Transmission owners clarified that these eight people could indeed be interchangeable depending on expertise and the topic covered. The spokesman expressed concern that participants in each meeting be brought up to speed before the meeting so as not to require rehashing and reexamination of topics already covered. They suggested that the website (noted below) provide summaries of meetings. Finally, the group suggested changing the agenda to leave the afternoon for caucus meetings rather than for group discussions.

The Small Generator working group indicated that resources were at issue, as many in this group do not have funds or manpower to draw from. The group expressed support of FERC basing its standard on Attachments A and B of the ANOPR rather than on the NARUC document, although NARUC would be considered on each issue. The NARUC/States Group commented that they did not want to get bogged down in jurisdictional niceties. At the end of caucus comments, it was agreed to change the agenda, allowing the three groups to meet separately throughout the remainder of the afternoon and prepare their positions.

Tuesday's session began with presentations by PJM and ERCOT of their interconnection policies, upon which FERC's ANOPR Proposals are based. Southern California Edison (SCE) then followed with a discussion of their Rule 21 procedures. The size limit and project cost issues arose again both during these reports and in questioning after, as did issues of pre-certification and expedited approval. NARUC then presented documents in which they had prepared side-by-side comparisons of the FERC ANOPR proposal and the NARUC Adopted Interconnection Guidelines. The representative noted that the NARUC Document, based on TX, CA, NY and OH documents, is primarily a technical document. In the

document, lightbulbs appear to mark policy issues that must be decided by regulators.

After subgroup sessions to discuss the agenda of issues relative to negotiating dates, the groups agreed on a common calendar (see below). All small generators would receive expedited interconnection; the defined group of smaller generators would receive "super-expedited" interconnection. The size issue emerged again, as groups debated whether to work within the FERC proposed divisions of 0-2 MW and 2-20 MW or to work on developing another division. The Transmission group protested when the FERC staff noted that it was likely the Commission would maintain these size divisions, and asked for time to define an alternate sizing.

The meeting schedule was set, and the eight principal negotiators proposal agreed upon. These negotiators will be the only ones permitted to address issues on behalf of the group they represent. Observers from these groups or the general public will be permitted, but will not be permitted to address the issues. They must instead pass notes to those at the negotiating table. The agreed upon agenda for the remaining open meetings is as follows:

<i>September 19 (Thursday)</i>	
AM Pre-certification (super-expedited) <ul style="list-style-type: none"> • Standards & Definitions • Testing • Pre-certification list manager 	PM Pre-certification (super-expedited) <ul style="list-style-type: none"> • Standards & Definitions • Testing • Pre-certification list managers
<i>September 26 (Thursday)</i>	
AM Interconnection Process (expedited process) <ul style="list-style-type: none"> • Flow Chart • Timeline • Question web position • RTO interfaces 	PM Interconnection Process (expedited process) <ul style="list-style-type: none"> • Feasibility study • System Impact Study • Study Cost Recover • Network vs. Energy resources
<i>October 1 (Tuesday)</i>	
AM Technical & Process Issues	PM Dispute resolution, Costs related to studies & dispute resolution process
<i>October 10 (Thursday)</i>	
AM Interconnection Agreement	PM Dispute resolution
<i>October 18 (Friday)</i>	
AM Clean-up	PM Clean-up

FERC will post all relevant documents at:
<http://smallgen.intranets.com/login.asp?link=>

The DG Monitor IndexSM

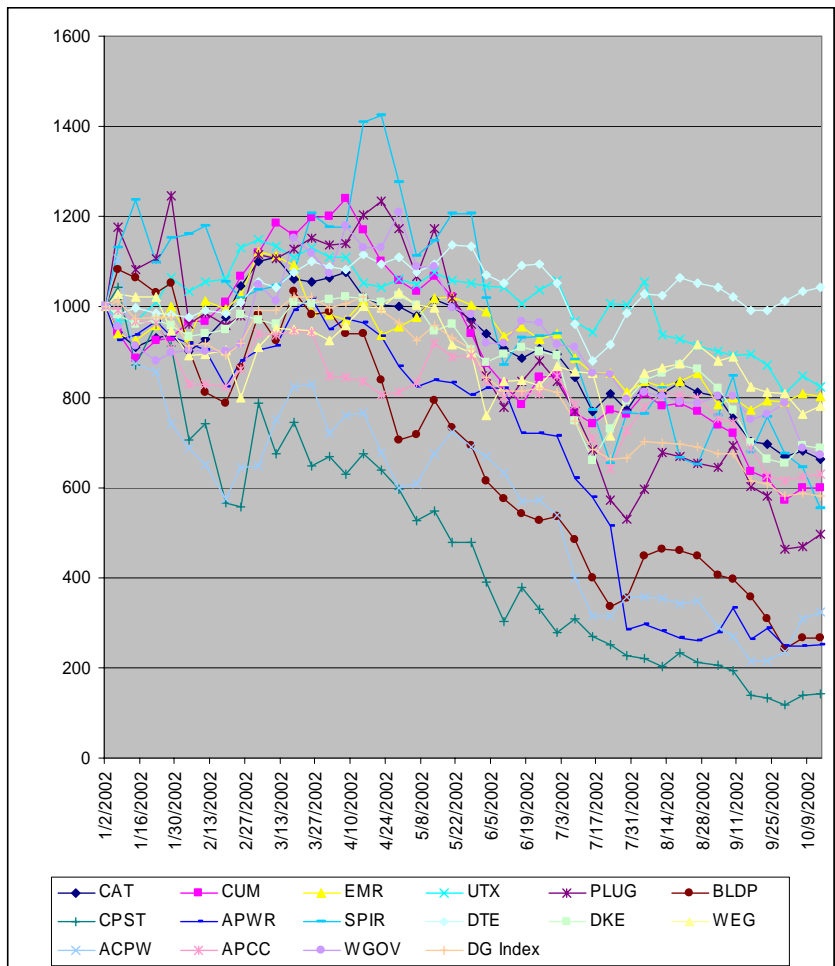
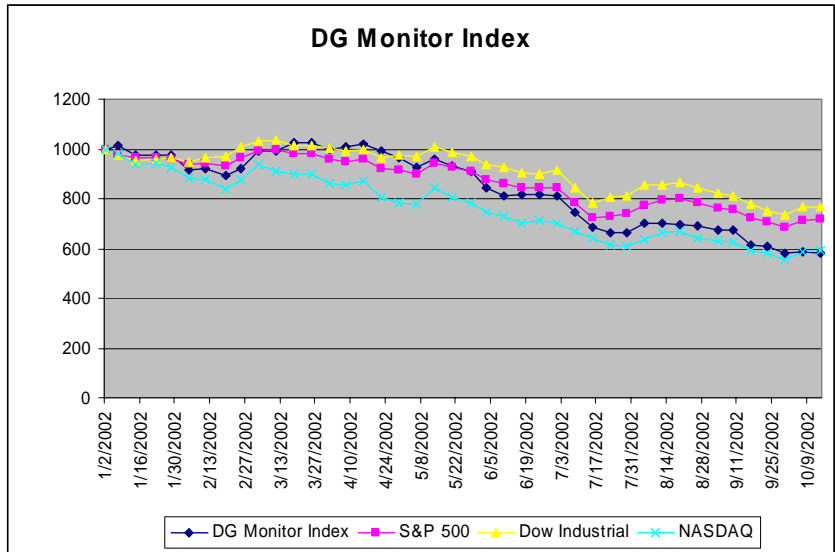
On October 7th 2002, the DG Monitor IndexSM began under-performing all three major stock indexes (S&P 500, Dow Industrial and NASDAQ). So far during 2002, the DG Monitor IndexSM is down over 40 percent.

Companies included in the DG Monitor IndexSM 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)

The graph on the lower right shows the 15 stocks, all normalized to 1000 at the beginning of the year. Only one stock in the DG Monitor IndexSM, DTE Energy, has posted a gain this year. Other top performers include United Technologies, Emerson Electric, and Williams Energy.

The most embattled performers have been emerging technology manufacturers. Capstone Turbine, a microturbine manufacturer, has suffered the most, down around 85 percent. Others weighing on the Index include AstroPower Incorporated (a PV manufacturer), Ballard Power Systems (a fuel cell manufacturer), and Active Power (a flywheel storage manufacturer). ■



Note: Graph is intended for viewing in color. Printed versions may obscure certain stock performances.

DG NOTES

Oct 3, 2002 - **FuelCell Energy**, in a modification to the existing Vision 21 program agreement with the U.S. Department of Energy (DOE), will demonstrate two additional sub-megawatt power plants based on the Company's Direct FuelCell/Turbine® technology. The extended scope of the work is the result of successful proof-of-concept tests of a DFC/T power plant based on a 250kW Direct Fuel Cell integrated with a modified Model 330 microturbine made by **Capstone Turbine Corporation**.

Sept 23, 2002 - **DTE Energy**, in partnership with the U.S. Department of Energy and technology providers including **Plug Power**, will develop, build and operate an integrated hydrogen energy system capable of delivering 15,000 kWhrs to demonstrate a non-fossil, fuel-based energy system.

Sept 18, 2002 - **Environmental Power Corporation (EPC)** obtained license for use of a Danish anaerobic digestion technology to extract methane from farm waste for the production of renewable electricity that can be used during peak demand or off peak periods. The systems, used successfully in Europe for a number of years, are expected to substantially reduce farm odor and address both water and air quality concerns caused by animal waste.

Sept 12, 2002 - California Gov. Gray Davis signed legislation that requires the state to double its supply of renewable energy to 20 percent of all retail power sales by 2017, the highest level in the U.S. Earlier, it was announced that a wind power project with capacity to power up to 17,000 homes has plugged into the California electricity grid near Palm Springs.

Sept 2002 - Projections estimate that the Advanced Reciprocating Engine Systems (ARES) work on 1-MW to 3.5-MW engines will result in performance characteristics such as 65% or greater turbocharger efficiency and a mechanical efficiency of more than 90%.

Sept 2002 - A DG System that includes two 60-kW **Capstone** microturbines and heat exchangers (a desiccant dehumidification system will be added later) was installed at the Breeden YMCA in Angola, Indiana to lower costs and provide backup power, water heating and space heating. Partners in the

DG Questions? Ask the DG Monitor.

A new column will appear in the Nov/Dec issue of the DG Monitor, responding to reader's questions about the distributed generation market and DG technologies. If you have any questions, please email them to askthemonitor@rdcnet.com. In each new issue, a few questions will be selected and answered.

project include the Build Indiana Fund, Cole Foundation, Indiana Department of Commerce, U.S. Department of Agriculture, the U.S. Department of Energy's Office of Distributed Energy and Electric Reliability, and **NiSource Energy Technologies**.

Sept 2002 - **Johnson Controls, Inc.**, under contract to the Navy Renewable Energy Division at the Naval Air Weapons Station in China Lake, California, has purchased nine **Plug Power Inc** GenSys™5C 5kW, CHP, grid parallel, natural gas-fueled, PEM fuel cell systems.

Sept 2002 - **IdaTech** commercially launched its FPM 20^(TM) fuel processor module, designed for integration into fuel cell systems or for use as a stand-alone hydrogen generator producing high-purity hydrogen. ■

RDC DG NEWS

Conferences

"Universal Interconnection Technology" – presentation by E.J. Honton at *CADER/DPCHA Conference*, San Diego, Nov 11-12, 2002.

E.J. Honton will attend *Communication and Control Systems for Distributed Energy*, sponsored by BPA and Pacific Northwest National Laboratory, Stevenson WA, Oct 24-25, 2002.

Paul L. Lemar, Jr. will attend the *3rd Annual National CHP Roadmap Workshop, CHP and DER for Federal Facilities, EPA CHP Partnership Meeting*, Boston, MA, Oct. 23-25, 2002.