

FUEL CELL SUMMIT

Volume 3, Issue 1

A quarterly newsletter published by the U.S. Department of Energy for the U.S. fuel cell industry to foster development and adoption of codes and standards

Coming to a town near you! DOE's DER "Road Show"

Local regulators get hands-on experience with fuel cells, other distributed energy technologies

Over the next decade, distributed energy resources will help optimize the energy delivery infrastructure of the United States. To effectively meet this objective, industry, utilities, and regulators must coordinate their efforts to create a streamlined process for siting and permitting distributed generation devices.

To support this effort, the U.S. Department of Energy's Office of Distributed Energy and Electric Reliability is sponsoring a series of "DER Road Shows," designed to train building code inspectors, fire marshals, and utility interconnection engineers on the installation, interconnection, and operation of new energy technologies. The one-day road show brings various manufacturers and their products directly to interested city agencies. The show includes presentations on distributed energy technologies relevant to local jurisdictions, and the various codes and standards that apply to those technologies. A facilitated discussion is included at the end of the show that engages local and state regulators in a dialogue with manufacturers to discuss local regulations and technical issues.

To date, road shows have been held in San Jose, San Diego, and Sacramento, California; Brooklyn, Long Island, and Albany, New York; and Las Vegas, Nevada. Typically 80 to 120 participants attend each show, including city and county planning staff, inter-connection engineers, building code authorities, fire marshals, builders, architects, electrical contractors, and others

who want to learn more about the technologies, their installation, and the permitting process.

The one-day format can accommodate up to three technologies, one fuel and/or application, and a session on electrical interconnection. The technologies, fuel choices, and applications include:

TECHNOLOGIES		
PV/solar	Wind Fuel cells	Microturbines
Natural gas-fired reciprocating engines		Electrical interconnection/switchgear
APPLICATIONS		
Peak shaving	Combined heating and power	
FUEL CHOICES		
Natural gas/methane	Hydrogen	

The following cities are slated to host road shows in 2002. Additional road shows are planned for Washington, Oregon, and Hawaii in October and November 2002.

Upcoming DER Road Shows

Midwest:

Springfield, IL, Sept 9
Chicago, IL, Sept 11
Detroit, MI, Sept 13

New England:

Burlington, VT, Sept 23
Portland, ME, Sept 25
Concord, NH, Sept 27
Western MA, Oct 7
Boston, MA, Oct 9
Connecticut, Oct 11

For more information, or to request a road show in your state, contact Anne-Marie Borbely-Bartis at the U.S. Department of Energy's Office of Distributed Energy Resources, (202) 586-5196, anne-marie.borbely-bartis@ee.doe.gov.

For additional information, contact:

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Visit the Fuel Cells website at:
www.pnl.gov/fuelcells

Comment Period on Proposed I-Codes Closing Soon!

The International Code Council's (ICC) 2002 Code Development Cycle continues. Public Hearings on proposed code changes to the I-Codes and code

committee meetings were held on April 8-19, 2002, in Pittsburgh. The results of those meetings and the subsequent "Report of the Public Hearings" are now available at <http://www.intlcode.org/> for public review and comment.

(cont'd on page 6)

I-Code	2000	2001	2002	2003-2004	2004-2005	2006-2007
IBC International Building Code	NE - CDC	CDC	CDC	NE - CDC	CDC	NE - CDC
ICCPC International Performance Code	Draft	Draft - CDC - NE	CDC	NE - CDC	CDC	NE - CDC
IEBC International Existing Buildings Code	Draft	Final Draft	CDC	NE - CDC	CDC	NE - CDC
IECC International Energy Conservation Code	NE - CDC	CDC	CDC	NE - CDC	CDC	NE - CDC
IFC International Fire Code	NE - CDC	CDC	CDC	NE - CDC	CDC	NE - CDC
IFGC International Fuel Gas Code	NE - CDC	CDC	CDC	NE - CDC	CDC	NE - CDC
IMC International Mechanical Code	NE - CDC	CDC	CDC	NE - CDC	CDC	NE - CDC
IPC International Plumbing Code	NE - CDC	CDC	CDC	NE - CDC	CDC	NE - CDC
IPMC International Property Maintenance Code	NE - CDC	CDC	CDC	NE - CDC	CDC	NE - CDC
IPSDC International Private Sewer Disposal Code	NE - CDC	CDC	CDC	NE - CDC	CDC	NE - CDC
IRC International Residential Code	NE - CDC	CDC	CDC	NE - CDC	CDC	NE - CDC
IUWIC International Urban-Wildland Interface Code	-	Final Draft	CDC	NE - CDC	CDC	NE - CDC
IZC International Zoning Code	NE - CDC	CDC	CDC	NE - CDC	CDC	NE - CDC

NE = New Edition; CDC = Code Development Cycle

New edition is published every three years.

California Adopts Standardized Rules for Distributed Generation

(Courtesy of Scott Tomaszewski, California Energy Commission)

Many agree that uniform interconnection rules would reduce the cost of distributed generation (DG) over the long term, having a major impact on its successful deployment. Rule 21 is California's answer to a uniform rule.

Rule 21 and interconnection rules are synonymous in the California market. The rule gets its name simply by its location in the tariff booklets of the state's investor-owned utilities-Pacific Gas & Electric, Southern California Edison, and San Diego Gas & Electric. Prior to the beginning of 2001, the rule was not designed for small-scale DG interconnections. Rather, it focused on larger-scale projects consistent with Qualifying Facilities associated with the Public Utilities Regulatory Policy Act rules established in the late 1970s. As DG projects emerged in the late 1990s, the existing rule was clearly not a good fit for self-generation. Installation transaction costs were high and uncertainty associated with utility engineering evaluations existed.

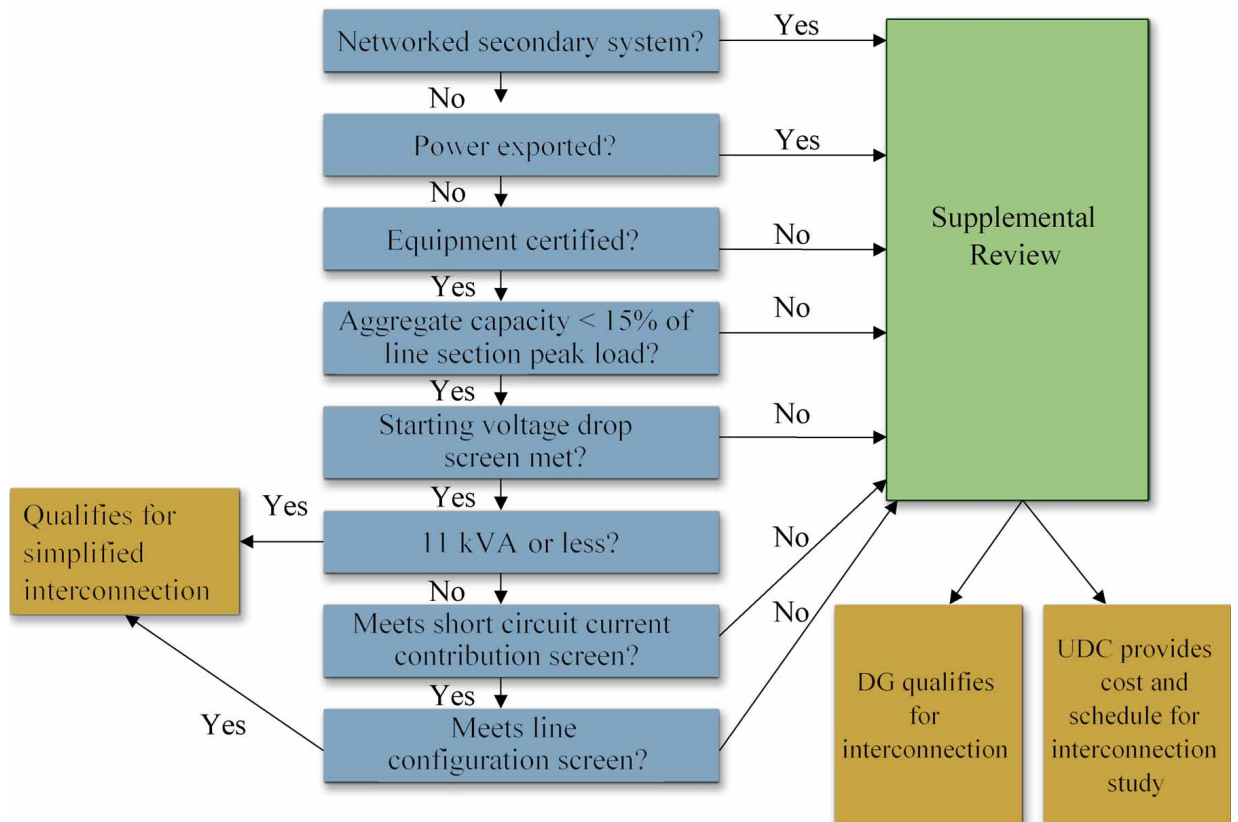
The California Public Utilities Commission (CPUC) and the California Energy Commission (CEC) embarked on a joint proceeding in late 1998 to investigate barriers to effectively deploying DG. The commissions concluded that the state needed stan-

standardized rules for interconnection across California. The CEC agreed to lead an effort to develop standardized rules and invited the nonCPUC-jurisdictional entities to actively participate. In December 2000, the CPUC adopted a set of new interconnection rules for California, a wholesale replacement of the old Rule 21. The new Rule 21 became effective in early January 2001.

The new rule provides better review certainty to less-complex applications than the old rule. A utility is now required to provide an approved interconnection request or a cost estimate for an interconnection study within 20 days of receiving a completed application and the \$1,400 fee. Previously, the utility did not have any time or cost commitments.

The figure illustrates the basic interconnection application review process. The initial review process evaluates the specific characteristics of a potential interconnection, including the facility, to determine whether additional requirements are necessary. It includes a series of yes/no screening criteria that help identify the simple cases for interconnection and those that require further evaluation by protection engineers.

Equipment tested and certified by an accredited, nationally recognized testing laboratory is considered certified for purposes of interconnection. The series of tests required under Rule 21 are primarily based on UL 1741, IEEE 929-2000, and New York Standardized Interconnection Requirements.¹



Standards Committee Activity Updates

- ▶ **ICC Codes.** The International Code Council® (ICC®), founded in 1994 as a nonprofit organization for developing a single set of comprehensive and coordinated national model construction codes, is seeking qualified individuals in the “User” and “Producer” Interest Categories to serve on the ICC Codes Committees for the 2002-04 Code Development Cycle. Appointments are for one cycle beginning in January 2003. Application forms can be downloaded at: <http://www.intlcode.org> or call 703-931-4533 extension 10. Contact: Larry Brown (ICC), (703) 931-4533 extension 15, lbrown@intlcode.org.
- ▶ **NFPA 5000.** The National Fire Protection Association’s Building Code Technical Correlating Committee has completed actions on public comments and, in May, the proposed NFPA 5000 Full-Service Building Code will be voted on by NFPA members. The latest draft can be downloaded at: <http://www.nfpa.org/BuildingCode/index.asp>. The next meeting of the Correlating Committee will be July 15 in Boston, MA. Contact: Karen Stein (NSFA), (617) 984-7263, kstein@nfpa.org.
- ▶ **ISO TC 197, Hydrogen Technologies.** The next ISO TC 197 meetings will be in June-11th for WG5-Gaseous Hydrogen blends and hydrogen fuel-service stations and filling connectors; 13th for WG7-Basic considerations for the safety of hydrogen systems; and 13-14th for the 2002 11th Plenary. Meetings will be in Montreal, Canada, in conjunction with the 14th World Hydrogen Energy Conference. Contact: Karen Miller (NHA), (202) 223-5547, kmiller@ttcorp.com.
- ▶ **IEC TC 105, Fuel Cell Technologies.** The next TC 105 meetings will be in June-10-11 for WG6- Fuel Cell Systems for Propulsion; 13-14 for the 2002 Plenary; 17-18 for WG2-Fuel Cell Modules; 19 for WG7-Portable Fuel Cell Appliances; and 19-20 for WG4-Stationary Fuel Cell Power Plants - Performance. The meetings will be in Montreal, Canada, in conjunction with the 14th World Hydrogen Energy Conference. Contact: Steve Kazubski (CSA America), (216) 524-4990 Ext. 8303, steve.kazubski@csa-america.org or steve.kazubski@csa-international.org.
- ▶ **ASME PTC 50, Performance Test Code on Fuel Cell Power Systems.** The Committee approved the draft and it is being reviewed for letter ballot approval by the ASME Board on Performance Test Codes. It has been submitted for public review through ASME Mechanical Engineering magazine and ANSI’s Standard Action. ANSI’s comments period closes May 28, 2002. To obtain the draft for review and comment, contact rodriguez@asme.org. Provided no comments are received the Code will be submitted for publication this summer and may be available late this year or early next year. Contact: Jack Karian (ASME), (212) 591-8552, karianj@asme.org.
- ▶ **NFPA 853, Installing Fuel Cells.** NFPA 853 is complete. Contact: Don Drewry (Hartford Steam Boiler), Don_Drewry@hsb.com or Richard Bielen (NFPA), (617) 770-3000, rbielen@nfpa.org.
- ▶ **NFPA 70 - Article 692, Fuel Cell Plant.** The closing date for Proposals for the 2005 NEC is November 1, 2002. Proposals for changes to Article 692 must be submitted by this closing date. Contact: Jean O’Connor (NFPA), (617) 984-7421, (617) 984-7070 (fax), joconnor@nfpa.org.
- ▶ **National Evaluation Service (NES).** The Protocol for Evaluation of Stationary Fuel Cell Power Plants is available to help fuel cell manufacturers and technology users better understand the testing and documentation that may be necessary to validate compliance with U.S. model building codes, and to secure more timely and widespread acceptance by the building community and approval by code officials. A copy of the protocol is available at www.nateval.org (copy and distribute as appropriate). Contact: Darren Meyers (BOCA), (708) 799-2300, dmeyers@bocai.org.
- ▶ **IEEE P1547, Distributed Resources and Electric Power Systems Interconnection.** A refinement of P1547 Draft content will state mandatory, minimum technical requirements to assure a technically sound interconnection. It will invoke dissolution of the existing ballot group and future establishment of a new ballot group. The writing group is working to have Draft 9 for consideration by the full P1547 working group in time for a June 2002 meeting. New IEEE interconnection standards projects being considered include (a) P1589 Draft Standard For Conformance Test Procedures for Equipment Interconnecting Distributed Resources With Electric Power Systems, (b) P1608 Draft Application Guide for IEEE Std. 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems, and (c) formation of a new standards project for distributed resources monitoring/control. The next P1547 WG meeting will be early summer 2002. Contact: Richard DeBlasio (NREL), (303) 384-6452, ddeblasi@tcplink.nrel.gov or Tom Basso (NREL), (303) 384-6765, thomas_basso@nrel.gov.
- ▶ **UL1741, Standard for Inverters, Converters and Controllers for Use in Independent Power Systems.** A draft of the second edition of UL1741 is being prepared based on the most current draft of P1547, corrections, updates and other changes identified through the use of the UL1741 document. UL is adding to their website new product guide cards that provide detailed information on inverters and converters covered under UL1741. These guide cards should address many AHJ, utility and general interest questions regarding the application and ratings of these products. Contact: Tim Zgonena (UL), (847) 272-8800 Ext. 43051, (847) 509-6298 (fax), timothy.p.zgonena@us.ul.com.


2002**Calendar of Events****MAY**

- 19-24 **Energex 2002: 9th International Energy Conference and Exhibition.** Witek Conference Centre in Krakow, Poland. Contact: 48 12 632 2748, 48 12 633 5047 (fax).
- 29-30 **Fuel Cells Summit VI.** Coordinating codes, standards and regulatory activities for buildings and transportation applications affecting fuel cells. The US Department of Energy Office of Power Technologies provides information and organizational support in developing performance, installation and operation standards for fuel cell technologies. The Inn and Conference Center of the University of Maryland at Adelphi (College Park). Contact: Maude Wickline at (703) 617-4254, maude.wickline@pnl.gov. See: www.pnl.gov/fuelcells.

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- 1-6 **The First International Conference on Polymer Batteries and Fuel Cells.** Shilla Hotel in Jeju Island, Korea. For more information, see: <http://pbfc.kaist.ac.kr>.
- 2-5 **ENERGY 2002-Hot Challenges, Cool Solutions Workshop & Exposition.** Federal Energy Management Program Annual Workshop and Trade Show sponsored by Federal Energy Management Program, U.S. Department of Energy Co-sponsored by Department of Defense and General Services Administration. Palm Springs Convention Center, Palm Springs, CA. Contact: Jane McGuire at (703) 921-1719, jmcguire@mcneiltech.com or JoAnn Stirling at (800) 395-8573. See: <http://www.energy2002.ee.doe.gov>.
- 2-5 **WINDPOWER 2002.** Oregon Convention Center, Portland, OR. American Wind Energy Association. Contact: AWEA at (202) 383-2500, (202) 383-2505 (fax).
- 3-4 **The Business of Fuel Cells for Automotive Applications.** The Marriott Dearborn Inn Hotel, Dearborn, MI. Contact: registration@eyeforfuelcells.com, 1-800-814-3459. See: <http://www.eyeforfuelcells.com/events/detroit2002/>.
- 3-5 **2002 Future Car Congress.** Sponsored by the U.S. Department of Energy and the U.S. Council for Automotive Research, Hyatt Regency Crystal City, Arlington, VA. Contact: (724) 772-4006, meetings@sae.org. See: <http://www.futurecarcongress.org>.
- 3-5 **Design of Distributed Generation Systems for Commercial and Industrial Businesses.** University of Wisconsin-Madison. Best Western Inn Tower, Madison, WI. Contact: (800) 462-0876.
- 9-13 **The 14th World Hydrogen Energy Conference: The Hydrogen Planet.** Queen Elizabeth Hotel, Montreal, Canada. The International Association for Hydrogen Energy, CHA and National Hydrogen Association. Contact: University of Quebec Conference Registration at 1.819.376.5108, 1.819.376.5164 (fax). See: <http://www.hydrogen2002.com>.
- 10-12 **2002 APPA National Conference.** American Public Power Association. Wyndham Anatole Hotel in Dallas, TX. Contact: Paulette Kum at (202) 467-2941, (202) 467-2910 (fax).
- 10-13 **40th Power Sources Conference.** US Department of Defense. Cherry Hill, NJ. Contact: Rnadell@ocm411.com.
- 15-20 **Solar 2002: ASES National Solar Conference.** Reno, NV. American Solar Energy Society. Contact: ASES at (303) 443-3130, (303) 443-3212 (fax).
- 20 **IEC Standardization Management Board Meeting.** Geneva, Switzerland.
- 22-25 **93rd Annual IDEA Conference & Trade Show-District Energy/CHP 2002.** International District Energy Association. Wyndham Baltimore Inner Harbor, Baltimore, MD. Contact: IDEA at (508) 366-9339, (508) 366-0019 (fax).
- 25-26 **Fuel Cell Technology Institute 2002.** Hyatt Regency Irvine, Irvine, CA. Contact: Lisa Gasaway at (918) 832-9245, (918) 831-9875 (fax), lgasaway@pennwell.com. See: www.fuelcell-event.com.
- 25-28 **Pacific Coast Builders Conference.** San Francisco, CA.
- 25-28 **International Fuel Ethanol Workshop & Trade Show.** Crowne Plaza Hotel in Springfield, IL. Contact: Angela Graf at (719) 942-4353, (719) 942-4358 (fax). See: <http://www.bb ethanol.com/few>.
- 1-5 **Fuel Cell 2002.** International Conference with Exhibition, in conjunction with The Fuel Cell World and the Fifth European SOFC Forum, Kultur- und Kongresszentrum Luzern of Lucerne, Switzerland. Contact: Organizer at 41 - 56 - 496-7292. See: www.efcf.com.
- 21-25 **IEEE Power Engineering Society Summer Meeting.** Palmer House Hilton, Chicago, IL. Contact: Exelon at (630) 437-2903.

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California Adopts Standardized Rules for Distributed Generation (cont'd)

Test Type	Reference ^(a)	Inverter	Synchronous Machine	Induction Machine
Utility Interaction	UL 1741 - 39	Required	Required	Required
DC Isolation	UL 1741 - 40.1	Required	Not Required	Not Required
Simulated PV Array (Input) Requirements	UL 1741 - 41.2	Required	Not Required	Not Required
Dielectric Voltage Withstand	UL 1741 - 44	Required	Required	Required
Power Factor	UL 1741 - 45.2.2	Required	Required	Required
Harmonic Distortion	UL 1741 - 45.4	Required	Required	Required
DC Injection	UL 1741 - 45.5	Required	Not Required	Not Required
Utility Voltage and Frequency Variation	UL 1741 - 46.2	Required	Required	Required
Reset Delay	UL 1741 - 46.2.3	Required	Required	Required
Loss-of-Control Circuit	UL 1741 - 46.4	Required	Required	Required
Short Circuit	UL 1741 - 47.3	Required	Required	Required
Load Transfer	UL 1741 - 47.7	Required	Required	Required
Surge Withstand	J.3.a of Rule 21	Required	Required	Required
Anti-Islanding	J.3.b of Rule 21	Required ^(b)	Required ^(b)	Required ^(b)
Non-Export	J.3.c of Rule 21	Required ^(c)	Required ^(c)	Required ^(c)
In-Rush Current	J.3.d of Rule 21	Required ^(d)	Required ^(d)	Required ^(d)
Synchronization	J.3.e of Rule 21	Required ^(e)	Required	Not Required

- (a) Reference refers to section number in either UL 1741 or Rule 21. References within UL 1741 to “photovoltaics” or “inverter” may have to be interpreted by the testing laboratory to appropriately apply the tests to other technologies.
- (b) Required only if Non-Islanding designation is desired.
- (c) Required only if Non-Export designation is desired.
- (d) Required for devices that use Electrical Corporation power to motor to speed.
- (e) Required for all synchronous machines, as well as inverters that operate as voltage sources when connected to Electrical Corporation.

Testing Requirements for Rule 21 Certification

More importantly, the tests are designed to be consistent with national standards being developed by IEEE. As shown in the table, UL has defined most of the tests. Other tests not developed by UL are explicitly contained in the rule language.

Equipment certified under Rule 21 helps offset the costs of interconnection by providing less evaluation time for utility protection engineers. In California, several applications have received expedited review and subsequently a lower review cost since the first two pieces of equipment were certified in winter 2001. The CEC expects this trend to continue as more generating facilities gain Rule 21 certification.

The CPUC and CEC recognize that the Rule 21 Working Group, lead by the CEC, will continue to refine the rule. The group includes 35 active members from various stakeholder groups, including utilities, manufacturers, and regulators. Another 130 members are on the distribution list for meeting agendas, documents, and other informational items. The group meets approximately once a month and

addresses the technical and nontechnical issues surrounding DG and Rule 21. To date, the group has met 31 times, producing rule language, standardized interconnection agreements, and enhanced application forms, and legitimizing a process for certifying equipment.

For more information about the Rule 21 Working Group and related information on DG, visit the CEC DG website at www.energy.ca.gov/distgen or contact Scott Tomashefsky via email at stomashe@energy.state.ca.us.

¹ Underwriters Laboratories, Inc. (UL), January 2001, UL 1741, “Inverters, Converters and Charge Controllers for Use in Independent Power Systems”; Institute of Electrical and Electronics Engineers, Inc. (IEEE), April 2000, IEEE 929-2000, “Recommended Practice for Utility Interface of Photovoltaic Systems”; New York State Public Service Commission, 1999, *New York Standardized Interconnection Requirements et al.*

Comment Period on Proposed I-Codes Closing Soon! (cont'd)

The deadline for recommending actions other than those taken at the public hearings is July 3, 2002.¹ The ICC will publish the public comments and the "Final Action Agenda" on August 20, 2002. Public comments will receive Final Action Consideration at the ICC Joint Meeting of BOCA, ICBO, and SBCCI² on September 29-October 4, 2002, in Ft. Worth, Texas. The resulting publication will be the 2003 Editions of the I-Codes.

The next opportunity to submit code change proposals is tentatively set for February 15, 2003, for submission in the 2004 Supplement to the I-Codes. Code changes proposed after February 15, 2003, will be considered for the 2006 Editions of the I-Codes.

For more information, contact Larry Brown of the ICC at (703) 931-4533 Ext. 15 or e-mail lbrown@intlcode.org. Commenters can submit comments online using the ICC Codes Comment e-Form or by mailing the printed form to ICC Program Manager, 5203 Leesburg Pike, Suite 600, Falls Church, Virginia 22041.

¹ Comments must be submitted in accordance with Section 6.0 of the ICC Code Development Process for the International Code. Comments submitted with incorrect format or without the required information will not be processed and will be returned to the commenter for corrections.

² Building Codes and Code Administrators, Inc.; International Conference of Building Officials; Southern Building Code Congress International.

Fuel Cell Research Consolidated Under DOE Office of Energy Efficiency and Renewable Energy Reorganization

The Department of Energy Office of Energy Efficiency and Renewable Energy (EERE) has announced a reorganization that significantly changes its structure. One notable change is that fuel cell and hydrogen fuels research and development (R&D) will be consolidated under the Office of Hydrogen and Infrastructure (see table). Under the old structure, these areas of research were split among three separate areas in two offices.

Combining fuel cell and hydrogen fuels R&D under one office is expected to benefit transportation and

stationary applications, as well as production, storage, and distribution of hydrogen fuels activities. Other distributed energy resource programs (e.g., microturbines and combined cooling, heating, and power) will be moved into the Office of Distributed Energy and Electricity Reliability.

The consolidation was announced as part of a larger EERE reorganization, intended to change its orientation from "sectors" to "programs." Artificial organizational layers were previously superimposed over "programs," causing inefficiencies in management; e.g., overlapping functions and too many layers under which programs were "buried."

Details of the reorganization are not yet finalized but are expected in early June. More information is available at the EERE website: http://www.eren.doe.gov/eere/pdfs/eere_reorg.pdf.

New EERE Office Structure

Hydrogen and Infrastructure: Includes OTT/ Fuel Cells, OPT/ Hydrogen, DER/ Fuel Cells, and any other hydrogen system-specific R&D-related work.

Biomass: Includes OPT/ Biopower, OTT/ Biofuels, OIT/ Black Liquor Gasification, OIT Agriculture, and OIT/ Forestry black liquor activity.

Building Technologies: Includes Building Envelope and Systems, Appliances and Equipment, OPT/ Solar/ Zero Net Energy Buildings, and Energy Star.

Distributed Energy and Electricity Reliability: Includes Distributed Energy Resources, Transmission Reliability, Energy Storage, and HTS. DER/ Fuel Cells will be moved to Hydrogen and Infrastructure.

FEMP: Includes Interior FEMP funding and E&W DEMP funding.

FreedomCAR and Vehicle Technologies: Includes Hybrid Systems, Advanced Combustion Engine, Electric Vehicle, Materials Technologies, Heavy Vehicle Systems, and Fuels Utilization R&D, as well as R&D-related or private sector-related elements of Technology Utilization. Any government grants-related components will be moved. OTT/ Fuel Cells will be moved to Hydrogen and Infrastructure.

Geothermal: Includes all Geothermal.

Industrial Technologies: Includes IOF Vision Industries (less OIT/ Agriculture and OIT/ Forestry black liquor activity), IOF Crosscutting, OIT Industrial Technical Assistance, and the R&D-related or private sector-related elements of Financial Assistance. Government grant-related activities will be moved.

Weatherization and Intergovernmental Grants: Includes Weatherization; State, Community, and Tribal Grants Program; OPT/ International; Clean Cities; and any other government grants-related components of BTS, OIT, OTT, and OPT.

Wind and Hydropower: Includes all Wind and Hydropower. Any other fluid dynamics-related renewables work, such as ocean current, will be included here.

Solar: Includes PV, CSP, and Low-Temperature Solar Collectors (e.g., water heaters). Zero Net Energy Buildings activities will be moved to Building Technologies.