Buildings Technology Research and Development Working Group Meeting

February 19, 2009

Location: 950 L'Enfant Plaza DOE
Time: 1:30-3:30 p.m.

Attendees[1]	**Agency/Office**	
Shyam Sunder	DOC/NIST	BTRD Co-chair
Jerry Dion	DOE/EE-Buildings	BTRD Co-chair
Kevin Hurst	EOP/OSTP	
Paul Domich	DOC/NIST	BTRD Ex-Sec
Dru Crawley	DOE/EE-Buildings	
Alan Schroeder	DOE/EE-Buildings	
Francois Pin	ORNL	
Mark Halverson	PNL	
Patrick Hughes	ORNL	
Paul Torcellini	NREL	
David Campbell	USPS	
Bobbie Lippiatt	DOC/NIST	
Andy Persily	DOC/NIST	
Steve Bushby	DOC/NIST	
William Brodt	NASA	
William Swietlik	EPA	
Dale Manty	EPA	
Audrey Levine	EPA	
Kim Cochran	EPA	
Diana Bauer	EPA	
Gail Bentkover	EPA	
Alice Chen	EPA/AAAS	
Chris Smith (substitute attended)	Architect of the Capitol	
Larry Bank	NSF	
Ewa Lewandowska	Smithsonian Institution	

Next Meeting: March 12, 2009, 1:30 - 3:30 PM, 950 L'Enfant Plaza DOE

March 12, 2009	August 20, 2009
April 16, 2009	September 17, 2009
May 21, 2009	October 15, 2009
July 16, 2009	November 19, 2009
June 18, 2009	December 17, 2009

[1] Active Members not attending identified in light gray

Introductions: Working Group Co-chair Paul Domich opened the meeting of the Buildings Technology Research and Development (BTRD) working group welcoming the agency representatives and thanking them for their participation. Participants provided self-introductions.

Review of Minutes: Informal review of Minutes for January 15, 2009 was performed prior to the start of the meeting.

Presentation on Advanced Construction Technologies titled "Automated Free Form Construction" Francois Pin (ORNL) provided a presentation on current progress in developing automated free form construction. This type of construction technique uses robotic devices to develop 3-dimensional objects without the use of traditional forms used, for example, with laying concrete. The benefits to this type of construction technique are: higher productivity rates, safer working conditions, higher quality building products, more energy efficient designs and structures, healthier environments, and increased environmental sustainability. The historical problem of fitting, connecting, binding, and assembling many prefinished components remains a production bottleneck in today's construction processes. Research and development in automated free form construction is striving to change the construction process paradigm to one of CAD- to-construction with appropriate construction-level scale and accuracy, fast deposition rates, and use of cost-effective and sustainable materials.

Specific advantages to automated free form construction include:

- Low additional cost for increased complexity
- Better material utilization
- More optimum geometry/materials
  - Thermal efficiency
  - High strength/weight
  - Durability
  - Wireways, ducts built in
- Integrated combinations of materials and reinforcements
- Design freedom and flexibility
  - Curves, aesthetics, hollow structures, interior and exterior finishes
  - Easier integration of passive energy features
- Little or no pre-finish required -> less wastes, less transport
- Suited for mechanization/automation
  - "CAD-to-Construction"
  - Supports "whole building" approach
  - Quality metrology
  - Increased productivity
  - Better human resource utilization
- Significantly reduced costs

There exists a range of R&D programs investigating cementitious materials including the NIST High Performance Concrete Program, and others. ORNL

program includes investigation of “greener” materials for in automated deposition, multi-purpose/multi-material deposition concepts, rapid deposition rates of successive layers and initial feasibility demonstrations. This investigation is multi-disciplinary and includes:

- AFC-suitable materials (cementitious, insulating, greener and in-situ materials)
- Deposition processes and systems
- Large-scale Robotics and Controls (Near-field motions and process controls, Large-scale motions and building accuracy control)
- Metrology/Measurement Sciences (Process feedback at near-field and wall/building scale, Real-Time Quality monitoring, Built Inspection)
- Structural Modeling and Geometry Optimization (Architectural designs and whole-building approach to optimization for energy, strength, health, costs and materials resource-efficiency)
- “C-to-C”: CAD to Construction (Coupling with BIM)

Please see the attached presentation for the proposed timeline for transitioning these technologies to industry and for additional details on the presentation.

Review of the Pricing and Prioritization for the Implementation Plan for Net-Zero Energy, High-Performance Green Buildings Domich provided an overview of the Implementation Plan and led a detailed review of the pricing and prioritization of program activities contained in the plan, program impacts on new and existing buildings, impacts of these on other building attributes such as wind, seismic, durability and other WBDG building attributes, and the level of technology transfer contained in each goal area. Lead writers provided presentations on their areas and defended their goal area decisions.

The Subcommittee discussed the definition of technology transfer and concluded that technology transfer is conceptually different for different program activities and organizations. For example, fundamental basic research is often transferred to others for further research, development and demonstration activities, R&D results transfer to potential demonstration and implementation activities, and all result in knowledge and technology transfer to various entities involved in technology development and commercialization for the buildings sector. The definition used in the Implementation Plan is more generally defined as the program activities that promote this transfer rather than the technologies themselves.

Exemplar “Case Study” and “Design Principles” information guides produced by EPA were distributed to working group members. These guides provide demonstration/implementation information and general guidance principles to states, communities, and other stakeholders for their Brownfields Program on Stormwater Management on Compacted, Contaminated Soils in Dense Urban Areas.

Action Item: Paul Domich will finalize the Implementation Plan and have it ready for distribution by February 27, 2009.

Closure: Domich closed the meeting at 4:30 p.m. and thanked the agency representatives for their participation and implementation plan contributions.