



**BUILDING AMERICA CONSORTIA
AND
NATIONAL LABORATORY
STATUS REPORT**

January 2010

IBACOS®
| Home Quality + Performance |

MONTHLY STATUS REPORT, January 2010

Cooperative Agreement DE-FC26-08NT 02231

Prepared by IBACOS

I. CURRENT PROGRESS AT EACH GATE LEVEL

Task 2

Gate 1A – *Expected Whole House Energy Savings and Cost Targets*

- IBACOS updated the TRNSYS energy model to reflect the configuration of the Crestmont house plan, which is the plan type being used for the Cold-Pittsburgh Lab House. This TRNSYS model will be used to update an earlier parametric study of wall and window systems. The study, which compares the energy use and comfort index associated with each system, will be expanded to include modeling in Mixed-Humid and Hot-Dry climate zones. Results of the study will be completed and analyzed in February and used in a research paper for the Buildings XI Conference held in December 2010.

Gate 1B – *Systems Evaluations and Specifications*

- The field test at The New American Home® 2009 in Las Vegas, NV continued to take measurements related to the gas engine-fired mini-split heat pump system and the gas-fired tankless water heater.
- The field test at The New American Home 2008 in Orlando, FL continued to take measurements related to the thermal and moisture performance of the aerated concrete block wall. IBACOS expects to conclude this test in the near future.
- The mock-up research continued in IBACOS' facility. It focused on the most appropriate way to install an exterior door with a 9" wide threshold in an exterior wall over 10" wide without affecting wall durability. In this regard, IBACOS determined that a custom-made aluminum threshold was not necessary. The best approach for installing the door was to position it toward the exterior and install a modified plastic flashing pan underneath the threshold to manage water. The threshold is wide enough where minimal changes to the interior drywall and trim work will allow the door to operate properly.
- IBACOS worked with Johns Manville (JM), the manufacturer of Spider® sprayed-in fiberglass insulation and Corbond® closed cell spray foam insulation, to have these products applied to mock-ups in the IBACOS facility by one of its approved installers.
- When Spider® sprayed-in fiberglass insulation was installed, IBACOS made the following observations:
 - The insulation could not always be contained effectively within the staggered stud wall cavity, so the installer had to take extra care to compensate for this situation.
 - The insulation that was installed in a specially-constructed wall with Plexiglas®

- sheathing and top plate did not completely fill the entire wall assembly. A small pocket of the wall, which was behind a framing member for interior wall attachment, did not have full insulation coverage because the framing member obstructed the area.
- The moisture content of the insulation was higher than recommended levels, an issue discovered by using IBACOS' drying oven on a sample. The high level of moisture was likely due to improperly mixing the insulation with its binding agent.
 - The installer's device for measuring the moisture content of the insulation could only be used on 2x4 and 2x6 walls and not 2x8 walls, rendering it ineffective for the wall system IBACOS was testing.
 - For the attic mock-up, the installer had to get much closer to the application area than necessary for typical attic blown-in insulation systems. The lower vertical clearance at the attic eave meant that the installer had to move more slowly and carefully in this area, increasing installation time.
- The installation of the Corbond closed cell spray foam insulation in wall cavities and band joists proceeded smoothly except for a wall mock-up that had 1" insulating sheathing. With this mock-up, certain areas of the insulating sheathing became unattached from the wall studs when 5" of spray foam insulation were placed in the wall cavity.
 - IBACOS modified the lab house mock-up for building enclosure airtightness testing.

Task 3

Gate 2 – *Prototype House Evaluations*

- **Ecological Construction Laboratory – Champaign, IL, 50%, Cold.** Monitoring and data collection continued in January.
- **Harvard Communities – Denver, CO, 50%, Cold.** Data acquisition is underway and will continue for the rest of 2010. New homeowners that now occupy the house have given their consent to permit ongoing monitoring. Now that the house is occupied, IBACOS can evaluate the performance of the domestic water heating (DHW) system.
- **Imagine Homes – San Antonio, TX, 50%, Hot-Humid.** Research continued toward identifying a solar thermal system that will be eligible for local tax rebates. Efforts continued with engineering an advanced framing plan for the house and finalizing additional design details for the house. Groundbreaking is expected in late February 2010.
- **Insight Homes – Greenwood, DE, 50%, Mixed-Humid.** IBACOS' research focused on continuing to evaluate cost effective building specifications that will achieve the 50% level of energy savings. Additionally, work continued with refining a schedule for constructing a prototype house at the end of the second quarter this year.
- **K. Hovnanian Homes – Ontario, CA, 50% Hot-Dry.** IBACOS performed an initial quality assessment on December 7th and 8th and presented the results to the division on January 20th. After strategic planning took place in December, and teams were created to address needs

identified in each department to support prototype development and move toward a quality process management platform.

- **Meritage Homes – Phoenix/Tucson, AZ, 50% Hot-Dry.** The builder is still planning on using insulating concrete forms (ICF) construction technology in its Phoenix high performance package and advanced framing for its Tucson package. Pricing on these strategies was still underway in January.
- **Pine Mountain Builders – Pine Mountain, GA, 50%, Mixed-Humid.** Monitoring continued on the two completed 50% prototype houses. Research was focused on developing more cost effective design strategies that still meet the 50% savings milestone.
- **Wathen-Castanos – Fresno, CA, 50%, Hot-Dry.** In response to a process mapping session conducted by IBACOS last summer, the builder created six Work Improvement Groups (WIGs) to focus on improving those operations that affect the quality and efficiency in the construction and delivery of its high performance house package. During the second week of January 2010, IBACOS conducted training with the entire builder’s staff and all of its trade partners. IBACOS held a session on building science basics and another on strategic development and guidance for the WIGs. The former Director of Construction has now been elevated to the position of president and is effectively driving the entire team to embrace a culture of quality management and high performance houses. The builder has rolled out its second generation Hybrid Home and is still in the process of identifying the right plan and specification package for the prototype house, which will also serve as the “Concept Home” featuring the next generation of energy efficient options for its buyers.

Task 4

Gate 3 – *Initial Community-Scale Evaluations*

- **Imagine Homes – San Antonio, TX, 40%, Hot-Humid.** IBACOS continued to help the builder evaluate and document all G3 criteria at the 40% whole house energy savings level on a community scale.
- **Pine Mountain Builders – Pine Mountain, GA, 40%, Mixed-Humid.** The builder met all G3 “Must Meet” and “Should Meet” criteria. More than 10 houses are complete.
- **Tindall Homes – Mansfield, NJ, 40%, Mixed-Humid.** The builder met all G3 “Must Meet” and “Should Meet” criteria. More than 10 houses are complete.
- **Insight Homes.** In discussions with NREL in January, it was decided to include Insight Homes as one of the 40% Mixed-Humid communities for the 2010 Project Management Milestone Report. IBACOS continues to work with Insight Homes on various “Should Meet” Stage Gate criteria for communities, as well as other criteria related to prototype houses. Insight Homes was building 40% houses as its standard specification when it partnered with IBACOS in 2007. IBACOS has not conducted a formal prototype house with the builder.

II. SUMMARY OF TECHNICAL HIGHLIGHTS

Task 1 – *Building America System Research Management and Technical Support*

- IBACOS delivered the Initial Community-Scale Evaluation Annual Report and the BP2 Annual Report in January.
- IBACOS participated in a Quality Working Group meeting on January 20, 2010 at the International Builders' Show (IBS) in Las Vegas, NV. IBACOS presented proposed work related to new construction and retrofit quality management in 2010 that is still pending based on the approval of IBACOS' BP3 Project Management Plan.
- IBACOS coordinated with Building America Teams and participated in a conference call with National Renewable Energy Laboratory (NREL) to verify that five projects will be completed per the technical requirements and Stage Gate criteria in order to finish the 2010 Mixed-Humid Project Management Milestone Report. These communities are:
 1. Insight Homes, Sussex County, DE
 2. Pine Mountain Builders, Pine Mountain, GA
 3. Struever Bros. Eccles & Rouse, Baltimore, MD
 4. Tindall Homes, Mansfield, NJ
 5. Urbane Homes, Louisville, KY

Task 2

Stage 1 – *Integrated Solutions for Specific Climate Regions and System Performance Evaluations*

- IBACOS continued integrating technical details and results from the December mock-up activities into the final construction documentation for the Cold-Pittsburgh Lab House.
- IBACOS researched the airtightness of two double hung window units, one from Gorell Windows & Doors and another from MI Windows and Doors. Test results showed that the Gorell unit exhibited negligible air leakage and that the MI unit was almost as airtight. These test results lessened IBACOS' airtightness concerns over the use of double hung windows in the lab house.

Task 3

Stage 2 – *Prototype Houses*

- **Meritage Homes.** The builder is exploring using an innovative R-30 ICF wall system called HercuWall™ for the first floor construction with advanced framing for the second floor construction in the Phoenix, AZ market. Meritage Homes continued to conduct pricing in January.
- **K Hovnanian Homes.** IBACOS continued energy modeling, attempting to reconcile differences in individual measures generated by BEOpt for a 50% whole house energy savings strategy and those generated by EnergyGauge USA.

- **Imagine Homes.** The builder expects to construct its prototype house during the second three months of 2010. The primary technical solutions under investigation for this Hot-Humid house include 2x6 advanced framing and solar thermal water heating.
- **The New American Home 2010.** Although, the house was not ready for public touring during IBS, a special exhibition area set up within the Las Vegas Convention Center provided conference attendees with a well-produced, virtual tour of the house and an opportunity to visit product display booths for manufacturers involved in the project. In addition, IBACOS learned that the house has been sold and that construction recommenced in January. The homeowner and builder are committed to continuing the energy efficiency specifications established for the house. IBACOS will continue its commitment to the project by monitoring construction, providing assistance when needed, and providing energy efficiency certifications.
- **The New American Home 2011.** The energy efficiency design guidelines IBACOS gave to the builder and architect in October 2009 were reviewed with them again for incorporation into the construction drawings. The construction drawings were completed late in January, and permitting is underway. Construction is expected to start early in February 2010, and completion is planned for early October 2010.
- IBACOS continued to actively collect monitoring data from ten houses.

Task 4

Stage 3 – *Initial Community-Scale Evaluations*

- **Insight Homes.** Insight Homes had six sales during January and continued to construct houses that achieve the 40% level of energy savings. IBACOS continued to develop drainage strategies to ensure proper moisture management and building durability. Currently, the builder uses exhaust fans that coordinate operation to run intermittently throughout the day as needed to achieve a predetermined exhaust rate; however, this strategy does not provide a fresh air supply to the house. IBACOS has performed preliminary modeling to evaluate the effect that balanced whole house ventilation strategies would have on the house's energy use. In the past, Insight Homes has found that homeowners cannot be relied upon to change or properly maintain filters in ventilation systems. Therefore, the builder has requested that IBACOS explore ventilation strategies that do not require homeowner care.

Task 5

Stage 4 – *Project Closeout, Final Evaluations of BA Communities*

No 2010 activity planned.

Task 6 - *Other Research Activities*

IBACOS is waiting for approval of its BP3 Project Management Plan before starting new work in the proposed area of “Solution Sets for Whole House Retrofits.”

III. PROJECT MANAGEMENT ISSUES

The Building America Team Meetings for 2010 are listed on the Building Technologies Program Calendar, but no location is provided. While these meetings are typically held in Washington D.C. at DOE Headquarters, there has been discussion about hosting the meeting at a different location. Typically, these meetings are planned well in advance so that teams can make the appropriate travel arrangements. Without more detailed information, IBACOS is not able to make arrangements and is concerned about being able to adequately plan for the future Building America Team Meeting.

IV. INPUT ON UPCOMING EVENTS FOR EERE’S 30-60-90 DAY REPORT

IBACOS does not currently have an event for the EERE’S 30-60-90 Day Report.

CONFERENCE PRESENTATIONS

IBACOS gave a presentation on January 22, 2010 at the International Builders’ Show in Las Vegas, NV.

X-Ray of The New American Home	Brad Oberg
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