



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

November 2009

IBACOS[®]
| Home Quality + Performance |

MONTHLY STATUS REPORT, November 2009

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 finished developing a TRNSYS model that includes components of the mechanical system for the S&A Homes house plan. Whole house energy savings values can now be generated.
- IBACOS conducted WUFI modeling to determine the moisture conditions that result from insulating a foundation wall using two different approaches. The first approach, which is favored by the builder because of ease of constructability, involves including the specified interior layer of insulation, either extruded polystyrene (XPS) or polyisocyanurate insulation, with the foundation formwork in order to integrate the concrete and insulation in the wall. The second approach is a traditional method, where a basement foundation wall is insulated on the interior after the concrete is poured and allowed to cure for a period of time (assumed to be 2 ½ months in this case). WUFI modeling on the below-grade portion of the foundation wall (the largest section) indicated that the first approach slows down the drying of the concrete within the wall, causing the house to store more moisture in its finished state. The effect of this stored moisture, as well as the moisture from a drying concrete floor slab, cannot be modeled, and a moisture problem in the basement cannot be predicted. IBACOS selected the first approach to insulating the basement because of its constructability benefits and plans to closely monitor the basement for high moisture situations. If necessary, supplemental dehumidification could be used to handle any problems with moisture in the basement.

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 mock-up research continued in the IBACOS facility. It focused on examining an exterior door installation. The in-swing configuration for the exterior door could be accommodated by making some minor changes to the interior drywall and trim work around the door to allow for adequate clearances for the door latch, door handle, and door jamb (without reducing the overall thermal performance of the wall system). The next step in this research is to determine the most appropriate way, without affecting wall durability, to install an

exterior door with a 9” wide threshold (the widest possible) in an exterior wall over 10” wide. In this regard, IBACOS will experiment next month with a custom-made aluminum threshold that is wider than 9”.

- IBACOS worked with Johns Manville, the manufacturer of Spider® sprayed-in fiberglass insulation, to determine the product’s drying time if installed in the 2x8 wall cavities of the Cold-Pittsburgh lab house. WUFI analysis forwarded by the manufacturer indicated that in a worst-case scenario, the insulation needs 34 to 64 hours after installation for drying if it is installed in April (the scheduled installation date). The manufacturer also forwarded moisture content testing procedures that IBACOS could use onsite.
- IBACOS researched the installation implications involved with using Spider insulation as attic insulation. IBACOS consulted Johns Manville, who said the most important concern is to evenly and consistently spray the insulation on the surface of the attic drywall. Getting an installer who is experienced with this application is best. IBACOS has contacted a local installer who has some limited experience with this application and asked the installer to do a trial run next month on an attic mock-up IBACOS is building.
- IBACOS and Progress Lighting continued to refine the design, as well as develop the lighting specifications and scope of work, for the lab house’s lighting.

Task 3

Gate 2 – *Prototype House Evaluations*

- **Ecological Construction Laboratory – Champaign, IL, 50%, Cold.** Monitoring and data collection continued in November.
- **Harvard Communities – Denver, CO, 50%, Cold.** Data acquisition is underway and will continue for the rest of 2009. IBACOS has completed the second three months of data analysis ahead of the original goal. The house sold and is expected to be occupied starting in January. IBACOS currently has a verbal agreement with the new homeowners to continue with the monitoring process. IBACOS has initiated and delivered a written agreement to the homeowner for a signature.
- **Imagine Homes – San Antonio, TX, 50%, Hot-Humid.** Research continued to look for an appropriate solar water heating system for the prototype house. The initial product was changed because it lacked SRCC OG-300 certification, which is necessary to receive local and national rebates. The final product selection will likely occur in mid-December 2009. Efforts continued with engineering an advanced framing plan for the house, finalizing space conditioning loads, selecting appropriate HVAC equipment, and acquiring detailed pricing information. Ground-breaking is expected in early to mid-January 2010.
- **Insight Homes – Greenwood, DE, 50%, Mixed-Humid.** The PEX piping distribution system Insight Homes was using in most of its models was designed with the central manifold exposed to the interior or the garage, and it had water lines running through the insulated common wall between the garage and the conditioned space of the house. Insight Homes evaluated different strategies to bring the manifold into conditioned space in one of

its models and ultimately decided to construct an insulated enclosure in the garage to house the central manifold, which will also provide the main access to the conditioned crawlspace. This design change means the water distribution system will be contained completely within the conditioned space. Similar design strategies are being evaluated for the remainder of the model types in Insight Homes' product line.

- **K. Hovnanian Homes – Ontario, CA, 50% Hot-Dry.** An initial site visit and introductory meeting took place on November 4th and 5th. IBACOS will be performing an in-depth technical assessment on December 6th and 7th. A day later, IBACOS and the builder's senior staff are holding a strategic planning meeting regarding the prototype house. Construction on the house is set to start in mid-May 2010. Preliminary modeling for a 50% solution package is complete and will be reviewed during the meeting.
- **Meritage Homes – Phoenix/Tucson, AZ, 50% Hot-Dry.** IBACOS held an initial site visit and planning meetings with Meritage Homes to look at the opportunities associated with the builder's push toward a systems-engineering approach to achieve significantly higher performing houses. The builder's goal is a HERS rating of 50 or less. IBACOS will be working with Meritage Homes to evaluate its technical packages and compare it with the Building America 50% targets. In addition, IBACOS has performed a field assessment on the builder's current construction practices. Using the IBACOS Quality Check-Up (QCU) Scorecard system, this builder scored a 2.6 on a scale of 0-4. Zero indicates a high risk builder and four indicates a very low risk builder. IBACOS plans to deliver the scorecard results and a corresponding presentation to Meritage Homes at the next planning meeting taking place on December 10th, 2009.
- **Pine Mountain Builders – Pine Mountain, GA, 50%, Mixed-Humid.** Monitoring continued on the two completed 50% prototype houses. IBACOS is studying the effect of the ground-source heat pump desuperheater on hot water energy consumption. Discussions with the builder continued around developing a strategic plan for community-scale implementation of the existing 50% specifications, as well as exploring the implementation of more cost-effective design strategies that still meet the 50% savings milestone.
- **Wathen-Castanos – Fresno, CA, 50%, Hot-Dry.** IBACOS recently formed a partnership with Wathen-Castanos. The builder plans to begin construction on a 50% prototype house at the start of 2010. Wathen-Castanos is interested in moving toward 50% on a community scale. In addition to defining a 50% solution, IBACOS is working closely with the builder as it designs a quality management process that affects every aspect of its operations. In response to a process mapping session conducted by IBACOS last summer, the builder has 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 home package. During the second week of January 2010, IBACOS will be helping to train and guide the WIGs.

Task 4

Gate 3 – *Initial Community-Scale Evaluations*

- **ELDI/S&A Homes – Pittsburgh, PA, 40%, Cold.** The builder met all G3 “Must Meet” and “Should Meet” criteria and contributed to the 40% Joule milestone for the Cold climate that was delivered in 2009.
- **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.

II. SUMMARY OF TECHNICAL HIGHLIGHTS

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

IBACOS delivered the Budget Period 3 Project Management Plan and the Prototype House Annual Report during November.

Task 2

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

IBACOS provided significant feedback to the National Renewable Energy Laboratory (NREL) on the proposed detailed analysis methods for the lighting category of the Building America Benchmark.

Task 3

Stage 2 – *Prototype Houses*

- **Wathen-Castanos.** IBACOS completed an initial assessment of the builder’s current construction practices. IBACOS has modeled several potential solutions for a prototype house that will achieve a 50-53% whole house energy savings level when compared to the Benchmark. The 53% solution includes R-49 attic insulation, a 16 SEER air conditioner, a 94% AFUE furnace, and very tight construction in combination with the builder’s standard specification package. The builder has resolved the challenge of meeting ASHRAE 62.2, which California will start requiring in 2010. Wathen-Castanos will meet this requirement using a point-source exhaust strategy, while providing makeup air through a mechanically dampered duct that prevents depressurization of the conditioned space.

- **Meritage Homes.** This builder is exploring several different strategies to achieve significantly higher performance in its houses. These strategies include advanced framing and production-level insulated concrete form (ICF) systems. IBACOS will provide additional analysis to identify other strategies that the builder can cost effectively implement on a production scale and achieve 50% whole house energy savings. Modeling the 50% solutions is ongoing.
- **Imagine Homes.** The builder expects to construct the prototype house during the first three months of 2010. The primary technical solutions under investigation for this Hot-Humid house include 2x6 advanced framing and solar thermal water heating. Per the builder's preferences, energy recovery ventilation (ERV) is no longer included in the design strategy. IBACOS is continuing to facilitate discussions among all of the involved parties to understand the technical and practical details of building to advanced framing specifications.
- **The New American Home® 2010.** Construction of The New American Home 2010 in Las Vegas, NV has halted due to financing issues encountered by the builder. As a result, the house will not be ready for public touring during the International Builders' Show (IBS) in January 2010. Instead, a special exhibition area within the Las Vegas Convention Center will give conference attendees a narrated, virtual tour of the house and allow them to visit product display booths for manufacturers involved in the project.
- **The New American Home 2011.** Design work is progressing on the project with construction drawings expected early in December 2009. Existing houses situated on the project's three-lot site have been carefully deconstructed to meet NAHB's National Green Building Standard™ requirements. IBACOS provided engineering support on gray water and rainwater harvesting systems that the builder is considering.
- IBACOS continued to actively collect monitoring data from ten houses.

Task 4

Stage 3 – *Initial Community-Scale Evaluations*

- **Insight Homes.** Insight Homes has not finalized the selection of a foundation drainage design for its standard house type of a single story over a conditioned crawlspace. Due to the well-draining soils found in most of central and eastern Delaware, the builder does not feel that an exterior drainage mat or footing drain is critical. IBACOS will continue to support the builder in evaluating the most appropriate drainage strategies to ensure proper moisture management and building durability.

Task 5

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

No 2009 activity planned.

Task 6 - Other Research Activities

IBACOS does not currently have work in this Task.

III. PROJECT MANAGEMENT ISSUES

The Building America Team Meetings for 2010 are listed on the Building Technologies Program Calendar but no location is listed. 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 February 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 participated in the "BIRA Alternative Wall Systems" Expert Meeting at the Sacramento Municipal Utility District (SMUD) in Sacramento, CA on Friday, November 13th, 2009.