I-RIM Conference 2016 Session Descriptions

Wednesday, June 1

Pre-Show Event: How to use the DOEs Roof Savings Calculator

By Joshua New, Oak Ridge National Laboratory

The Department of Energy's (DOE's) Roof Savings Calculator was developed as an industry-consensus standard for energy savings from modern roof and attic technologies for residential and commercial buildings. It uses DOE-2.1E for fast, whole-building energy simulations and integrates AtticSim, an ASTM standard, for advanced modeling of the roof assembly. Roof Savings Calculator (RSC) can simulate radiant barriers, cool/reflective roofing, multiple roof/attic configurations, slopes, above sheathing ventilation, low-emittance surfaces, duct locations, leakage rates, roof substrate types, and insulation levels. An annual simulation of hour-by-hour performance is calculated based on building properties and climate for the selected location. Annual energy savings are reported based on heating and cooling load reduction. This talk will present the context, capabilities, limitations, and the practical aspects of how to use (and not use) the Roof Savings Calculator. Active participation using www.roofcalc.com with provided examples will be encouraged (bring laptop).

Thursday, June 2

US Housing: The Gradual Recovery So Far and Prospects for Stronger Starts in the Next 5-10 Years

By Greg Lewis, RISI

Mr. Lewis will discuss reasons for the slow recovery in US starts, how FEA looks at the near-term housing outlook, and contrast that with medium- and long-run outlooks. He will look at the underlying demographic trends in housing, the significant "pent-up" demand for housing in the US, and will discuss assumptions on home sizes and the mix between single and multi-family units.

EU and US Technologies and Strategies

By Marc LaFrance, US Department of Energy

The presentation will include current trends in building energy consumption in the European Union and the United States and discuss emerging technologies including advances in building envelope. Various studies from the International Energy Agency along with the US DOE's energy policy plans will be discussed along with the feedback for industry's perspectives about the future.

Overview of Thermal Resistance of Enclosed Reflective Airspaces for Different Building Applications

By Hamed Saber, National Research Council Canada

Many parts of building envelopes such as walls, roofs and fenestration systems contain enclosed airspaces. The thermal resistance (R-value) of an enclosed airspace depends on the emissivity of all surfaces that bound the airspace, the size and orientation of the airspace, the direction of heat transfer through the airspace, and the respective temperatures of all surfaces that define the airspace. Assessing the energy performance of building envelopes requires accurate determination of the R-values of enclosed airspaces. In this study, a comprehensive review about the thermal performance of enclosed airspaces is conducted. This review includes the computational and experimental methods for determining the effective R-value of enclosed reflective airspaces. The effect of infiltration/exfiltration rate on the R-value of airspaces is investigated in this study. Also, the parameters that affect the thermal performance of enclosed airspaces are discussed. Finally, correlations for the R-values of enclosed airspaces of different inclination angels and directions of heat flow as a function of the parameters that affect the thermal performance of an enclosed airspace, namely: average temperature, temperature difference, aspect ratio, and effective emittance are provided. These correlations can be implemented in the currently available energy simulation models such as Energy Plus, ESP-r and DOE. The simplicity of these correlations suggests that this could be included in the future edition of the ASHRAE Handbook of Fundamentals.

Voluntary Product Verification Program

By Doug Kinninger, Fi-Foil Company

An overview of the program will be given and will include a review of the requirements for participation, the benefits of having your products RIMA-I Verified, and how this program raises the bar for reflective products. If you want to stand out from your competition and have your worldwide trade association promote your product, verification is the answer. This session will teach you how to get your product RIMA-I verified.

Building Code Update

By Wesley Hall, Reflectix, Inc.

RIMA-I Code Update: RIMA-I participates in two Building Code Development processes, International Code Council (ICC) and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). This presentation will provide a brief overview of the ICC code process and a discussion on the RIMA-I, ICC proposals in this cycle. Information on the ASHRAE process will be offered in a separate presentation.

Passive Radiative Cooling (Self-Cooling Materials)

By Bernard Casse, Parc

This presentation looks at the reasons behind the standardization of reflective insulation products in Europe and the standardization processes and services at national and European level. It also examines the current status of standards development for the assessment of thermal performance of reflective insulation products and the harmonization of rules for the declaration of performance on the market – including compliance with the European Construction Products Regulation, CE marking and labeling of such products.

Advancements in Protection of Plastics

By Shawn Lucas, Ampacet

The session begins with a review of fundamentals of polymer formation to form "plastics", followed by descriptions of environmental variables that initiate and propogate property failure. Shawn will introduce chemistries that combat UV and thermal degradation to overcome the environmental stresses and offer case studies and examples where these materials have succeeded in the past.

Attic Radiant Barrier Systems to Save Energy

By Andre Desjarlais, Oak Ridge National Laboratory

Radiant barriers systems and low-emittance surface coatings are used in residential building attics to reduce conditioning loads from heat flow through attic floors. The roofing industry has been developing and using various radiant barrier systems and low-emittance (low-e) surface coatings to increase energy efficiency in buildings. Implementation of radiant barriers is also becoming more prominent in building codes. However, minimal data are available that quantify the effectiveness of these technologies.

This study evaluates performance of various attic radiant barrier systems under simulated weather conditions using the large scale climate simulator (LSCS). The four attic configurations that were evaluated are 1) no radiant barrier (control), 2) perforated low-e foil laminated oriented strand board (OSB) deck, 3) low-e foil stapled on rafters, and 4) liquid applied low-emittance coating on roof deck and rafters. All test attics used nominal R_{US} 13 h-ft^2-°F/Btu (R_{SI} 2.29 m^2-K/W) fiberglass batt insulation on attic floor. Results show that the three systems with radiant barriers reduced heat flow through the attic floor during summer daytime condition by 32.8%, 49.8%, and 19.1% lower than the control, respectively.

The heat flow through the attic floor decreases with higher insulation R-values or during milder weather conditions. Therefore, for attics with higher insulation R-values the potential savings due to the application of radiant barrier systems will be lower. The experimental data is used to benchmark an attic model using whole building energy simulation software EnergyPlus. Annual energy savings potential of the various radiant barrier systems for code-level attic insulation was calculated for various climate zones using the calibrated EnergyPlus model.

Field Evaluation of Radiant Barrier and Reflective Insulation Products in Malaysia

By Teh Khar San, San Miguel Yamamura Woven Products

A two-year study involving thermal performance evaluation of side-by-side identical test huts will be discussed in this presentation. The objective of this study was to document the performance of below roof (attic) reflective assemblies located in Malaysia. Heat-flux data and temperatures have been recorded for more than 20 insulation systems including various combinations of radiant barrier, bubble foil, foam foil, mass insulation, concrete tiles, clay tiles, metal deck with different configurations. The presentation will describe the test facility, summarize the test plan, data selection criteria for R-value calculation and examples of results that have been obtained.

Commentary on ASTM C1224

By David Yarbrough, R&D Services, Inc.

The ASTM Standard Specification for reflective insulation (C1224) specifies the hot- box (C1363) for the determination of R-value. C1224 directs a calibration be performed in order to make a framing correction. Uncertainty in the R-value of the calibration material results in added uncertainty in the result for the R-value of the reflective insulation. The conclusion is that special attention to evaluation of the calibration procedure is needed.

European Standardization and the Global Evolution

By Guy Delcroix

This presentation looks at the European Standards processes and the work to standardize the thermal performance testing of reflective insulation products. It also shows how the European work is now also being adopted in the international arena.

Evaluating Reflective Duct Insulation

By Michael Joyce

The requirements of ASTM C1668 "Standard Specification for Externally Applied Reflective Insulation Systems on Rigid Duct in Heating, Ventilation, and Air Conditioning (HVAC) Systems" will be discussed. A significant portion of the talk will be on the evaluation of thermal performance for reflective duct insulaion since an industry R-value is ultimately what the manufacturer has to be able to sell to the customer.

Friday, June 3

Roof/Attic Thermal Performance Simulations – 2015/2016 Update

By Jan Kosny, Fraunhofer CSE

This session begins with an introduction to Fraunhofer CSE. The discussion will include the motivation for the development of a new attic model; and the 2015/2016 numerical development work focused on the Fraunhofer Attic Thermal Model (FATM). Validation of the model using a series of hot box experiments performed by Oak Ridge National Laboratory will be shared as well as field test model validation which comprises test hut thermal performance field testing of 6 roof/attic configurations in Albuquerque, NM (Baseline attic configuration; Radiant Barrier Attic; Attic Using PCM Boards; Cathedralized Roof; and 2 types of BIPV systems). An example of the FATM application: numerical thermal performance predictions of the novel aerogel-based radiant barrier system using Albuquerque, NM, test data and FATM simulations for 11 climates worldwide will also be shared including future plans.

The Certification of Reflective Insulation for the European Market

By Martin Oxley, British Board of Agreement

Reflective Insulation products were late coming to the UK. Optimistic performance claims were initially made by some as industry was unsure on how to fully evaluate their true performance. A harmonized European product Specification Standard has been drafted – though this requires some amendments before going live soon In order obtain the CE mark and to sell products in any of the 33 key European countries once the standard is published, it will be a legal requirement to comply with this new standard to meet the European Construction Products Regulation. CE marking is currently little recognized in the UK; and independent third party certification is often the preferred route. The key components of Thermal and Emissivity evaluation are comparable with ASTM test methodology. Obtaining a BBA product certificate is the open door to the UK construction insulation market – worth circa £900M.

A Survey of Radiant Barrier and IRCC Modeling and Simulations

By Dr. Mario Medina, University of Kansas

A survey of radiant barrier and interior radiation control coating (IRCC) modeling and simulations is presented. Ceiling heat flux and space heating and cooling load reductions that result from the installation of radiant barriers and IRCCs are presented for various locations (climates) and attic insulation levels.

The Role of Third Party Ratings in Supporting the Roofing Industry

By Jeffrey Steuben, Cool Roof Rating Council

Understanding the performance of building envelope materials is a key component of determining the energy efficiency of a building. The Cool Roof Rating Council (CRRC) serves as an industry-wide rating agency to provide impartial energy performance data for roofing products. This presentation explores the history and development of the CRRC Product Rating Program, and describes the lasting impact the organization has had on the roofing industry and energy efficiency codes and programs. The presentation will also cover recent efforts in weathering simulation, developing rating methods for new and complex products, and the potential to rate other reflective surfaces in addition to roofs.

Mainstreaming the HERS Index

By Laurel Elam, RESNET

Annually 1/3 of all new homes sold are rated and issued a HERS Index Score. The 2015 IECC includes a new Energy Rating Index option. This will allow builders a more flexible option in meeting energy codes. This session will explain Home Energy Ratings, the new code option and show resources developed to market the HERS Index.

An Overview of the Building America Partnership for Improved Residential Construction (BA-PIRC) – Research Activities in Hot and Humid Climates

By Eric Martin, Florida Solar Energy Center

The US Department of Energy's Building America Program conducts applied research, development, and deployment in residential buildings. Building America's projects strive to simultaneously develop and demonstrate new and better technical solutions while overcoming associated market barriers in using these solutions. This session will describe research conducted by the Building America Partnership for Improved Residential Construction, led by UCF's Florida Solar Energy Center. Research focuses on issues related to low load HVAC and ventilation for indoor air quality in hot humid climates.

Reflective Insulation Materials in Russia

By Nina Umnyakova, Scientific Research Institute of Building Physics of Russia, Academy of Building Sciences

Russia has severe climatic conditions: design temperature in the winter in most parts of the Russian Federation falls below (-30) – (-40)^{0}C, but in summer time it greatly increases. On sunny days, in the presence of the incident solar radiation, the temperature on the surface of the structures is greatly increased. Therefore, to ensure the necessary thermal protection of the exterior walling and building envelope, it is advantageous to use not only the traditional thermal insulation materials like stone wool or EPS, but also reflective insulation materials. The presentation will describe the types of reflective insulation manufactured in Russia; and show some of the buildings where the reflective insulation is used. Also, the presentation will describe the test methods and evaluation procedures of thermal protection qualities of the reflective insulation materials used in Russia.

Latin America R-Value Standardization

By Sergio Luconi, Prodex

The progress of the construction industry in Latin America combined with the tendency of energy consumption reduction plus the weather climate change especially the lack of official or technical guidelines on thermal building performance will be discussed. There is a need to develop technical standards for reflective insulation and radiant barriers along the lines of ASTM, ISO and ASHRAE on the selection of the R-value and the quality needed to comply with the international standards as ASTM, ISO, Ashrae, and LEED. The first part of the code is currently at the voting stage at the ISO platform "isolutions.iso.org". Mr. Luconi will be discussing the process and how the market is reacting with the standard proposal.

Reinforcing Our Place in Space

By Roger Drain, Dunmore Corporation

The presentation will cover a brief history of multilayer insulation systems and their various applications. We will discuss some of the challenges and how the integration of various types of woven and nonwoven fabrics has revolutionized spacecraft thermal protection. Recent advances in higher temperature materials have allowed MLI systems to provide for previously impossible missions to be thought of in a different light. In the end, we will demonstrate how the utilization of fabrics is truly "Reinforcing Our Place In Space".

Note: Descriptions will be added as they are received. Please check back for additional details.