

## **Thursday, March 6**

### **Growth Drivers and Investment Opportunities in European Construction 2014-16** – Michael Weingaertler

The European construction market is struggling in course of the public debt crises. Construction output is still below the 2008 level but country developments are very heterogeneous. Disparities within Europe are increasing because of uneven economic growth. National government initiatives and different timing of public stimulus programs reinforces this. The lecture covers the recent outlook in the main three construction sectors (housing, non-residential construction and civil engineering). Based on these trends national market opportunities will be derived.

### **Reflective Insulation Products – Standardization in Europe** - Carol Houghton, CJHconsult Associates

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.

- Noble Francis

The presentation will cover forecasts for the UK economy and key sectors of the construction industry over the next five years.

### **Thermal Performance of Reflective Products According to Existing Standards** – Salem Farkh, CSTB

The objective of the presentation is to demonstrate that a simple physical model can be developed on the basis of existing EN standards to express in situ thermal performance of air-tight building constructions insulated with reflective products. The model allows for a better consideration of reflective products performances by taking into account the combined effect of external temperature, solar and sky radiation.

### **Evaluation of the Performance of Reflective Insulations in North America** – Dr. David Yarbrough, R&D Services, Inc.

The requirements for reflective insulation in North America and the methods for meeting these requirements have evolved over a period of thirty years. A review of the history and current status of reflective insulation labeling will be presented.

### **Mainstreaming Energy Efficiency in the U.S. Housing Market: The Role of Home Energy Ratings** - Steve Baden, RESNET

Across the U.S. there is a growing trend of homebuilders rating their homes and marketing the HERS Index Scores of their homes. In 2013 over 200,000 homes in the nation received a HERS Index Score. Over 1.5 million homes in the U.S. have been rated. In addition there is a trend of building code jurisdictions having a HERS Index Score option. The 2015 International Energy Conservation Code will include an energy rating index option. This session will introduce the U.S. home energy rating system, compare it to the European Union's system and explore the market implications in the U.S.

## **Friday, March 7**

## **Measuring the Thermal Performance of Structures Using the Hot Box Apparatus** - Ray Williams C.Eng, MIMMM

This session will review the description of the steady state thermal properties that can be measured in the hot box apparatus. Principles of the hot box apparatus, the measurement techniques used, measurement challenges and typical uncertainties will be reviewed. The Hot Box measurement standards and extending the scope of the standard hot box apparatus will be discussed as well as what's next – outdoor test cells and energy rating of structures perhaps?

## **Computer Simulations of Enclosed Reflective Airspaces** - Hamad Saber, National Research Council Canada

The 2009 ASHRAE Handbook of Fundamentals provides a table that contains the thermal resistances (R-values) of enclosed airspaces for different values of airspace thickness, effective emittance, mean airspace temperature, and temperature differences across the airspace. This table is extensively used by modelers, architects and building designers in the design for thermal resistance of building enclosures. The effect of the airspace aspect ratio (length/thickness) on the R-value is not accounted for in the ASHRAE table. However, in previous studies by the author, it was shown that the aspect ratio of the airspace can significantly affect its R-value. In this work, computer simulations were conducted using the NRC's hygrothermal model called "hyglRC-C" to determine the R-values for enclosed airspaces of different: (a) inclination angles, (b) directions of heat flow, (c) thicknesses, (d) lengths, (e) aspect ratios. The computer simulations were conducted for a wide range of values for effective emittance, mean temperature, and temperature differences across the enclosed airspaces. The R-values predicted from computer simulations are compared with those provided in the ASHRAE table. Considerations were also given to investigate the potential increase in the R-values of enclosed airspaces when thin sheet is placed in the middle of the airspaces and whose surfaces have different values of emissivity. Thereafter, practical correlations were developed for determining the R-values of enclosed airspaces for future use by modelers, architects and building designers. These correlations can be readily implemented in currently available energy simulation models (e.g. ESP-r, Energy Plus, DOE, etc.). The simplicity of these correlations suggests that these correlations could be included in the ASHRAE Handbook of Fundamentals.

## **Investigating the Effects of Dust Accumulations on Heat Gain through Inclined Buildings' Roof with Radiant**

**Barrier System** – Shikha Ebrahim, Kuwait Institute for Scientific Research

The presentation covers a definition of our study; an inclined roof coupled with radiant barrier system (RBS). Then, it includes a description of the initial and boundary conditions that are used in numerical software (COMSOL multiphysics). Moreover, it is significant to define the governing equations of combined physics (heat transfers and fluid flow). Results of velocity, temperature profiles, Nusselt number, and Reynolds number are shown for various locations of RBS in the air gap between the two plates. Then, similar results are presented for a dusty weather conditions. Dust emissivity and its amount are considered as factors in the numerical model. The model alters to a time dependent in the case of having dust instead of stationary model. Finally, conclusion, recommendations and future work are clarified at the end of this research.

## **Reflective Insulation and Packaging** – Robert Wadsworth, Innovative Energy

Shipping temperature sensitive products often presents a challenge that reflective products can address. More companies are including reflective pouches, box liners, pallet covers as a panacea to their shipping needs. This brief discussion will highlight some of the novel solutions reflective insulation products bring to this market.

## **Mind the Gap** – Tim Fenn, \_\_\_\_\_

There is plenty of debate going on right now on design versus as built performance and how the poor installation of insulation in many projects has led to this. There is a growing concern that over time new home owners (whether they be private or HA's ) could actually take home builders and developers to court where expectations on energy performance were not met. Data from monitoring and research on the various buildings \_\_\_\_\_ has designed and built using multi-foil will also be discussed.