Dr. Joshua D. Kneifel

Dr. Joshua D. Kneifel is an economist in the Applied Economics Office of the Engineering Laboratory (EL) at the National Institute of Standard and Technology (NIST). Dr. Kneifel joined the staff at the Applied Economics Office from the University of Florida in 2008. His research at NIST implements whole building energy simulation, life-cycle costing, and life-cycle environmental assessment to determine the economic and environmental consequences of increasing the energy efficiency of building construction.

Metrics and Tools for Sustainable Buildings

Dr. Kneifel is the project lead for the "Metrics and Tools for Sustainable Buildings" project, which uses measurement science to develop and implement metrics for quantifying sustainability in building research, and develop decision support tools for stakeholders. Dr. Kneifel oversees the development of software tools that calculate the sustainability performance of individual building products (Building for Environmental and Economic Sustainability - BEES) and whole buildings (Building Industry Reporting and Design for Sustainability - BIRDS).

Publically released in 2010, BESS Online is the most recent version of NIST's well-known software for analysis of building construction products (e.g. insulation, flooring, concrete0. Products are updated and added to the software's database as manufactures make new data available using NIST's BEES PLEASE data collection process.
BIRDS is based on the BEES framework, but has expanded the analysis to life-cycle of whole building by using a combination of input-output analysis and process-based life-cycle assessment to determine the life-cycle costs and environmental performance of an entire building given the integrated nature of building enveloped and systems. In September of 2015, BIRDS v2.0 was publically released, which included results for both new commercial and new residential building prototypes to determine the cost-effectiveness of more energy efficient building designs, and the resulting reduction in a buildings environmental footprint.

BIRDS v3.0 is currently under development and will be released in late 2016. There will be significant improvements to the software interface, including additional input and output options, an updated new residential database, and an additional database focused on low-energy residential building designs based on NIST"S Zero Energy Residential Test Facility (NZERTF).

Dr. Kneifel is currently working with researchers at the Department of Energy's (DOE) National Renewable Energy Laboratory (NREF) to integrate the BIRDS sustainability analysis framework into OpenStudio, a user interface developed by NREF for DOE's EnergyPlus whole building simulation software. The planned tool will allow OpenStudio users to make sustainability calculations of custom building designs. A beta version of the tool is scheduled for public release in late 2016.

Net Zero Energy Residential Test Facility (NZERTF)

Dr. Kneifel works closely with other NIST researchers on analysis related to NIST's NZERTF, which is a facility designed to generate more energy from renewable sources than it uses over a one-year period while still having the "look and feel" of a typical house in the Gaithersburg, MD area. Dr. Kneifel used the measured data from the demonstration phase to develop a validated EngeryPlus whole building energy simulation model of the NZERTF that is now being used for a variety of research interest, including "what-if" scenarios that cannot being tested experimentally using the NZERTF (e.g. changing the thermal performance of the building envelope).