



# Hawaii Natural Energy Institute Projects

*Energy Efficiency & Transportation*

*Comfort Technologies for Naturally Ventilated Facilities*

## **PROJECT SUMMARY**

HNEI is leading a 3 phase investigation of the application of technologies to enhance comfort and displace traditional mechanical cooling in buildings. This project was completed in collaboration with Sustainable Design & Consulting LLC, UH Environmental Research and Design Laboratory, UH Sea Grant College Program, and Assumption University's School of Architecture and Design.

The first phase developed Computational Fluid Dynamic (CFD) protocols for predicting air flow in the external environment. The second phase develops and validates CFD protocols for air movement within a space and in communication with the exterior. The third phase applies these predictive models against actual application of the technologies, including radiant cooling and induced air movement.

## **PROJECT RELATED LINKS**

### **TECHNICAL REPORTS:**

1. [Literature Review of External Computational Fluid Dynamics](#), August 2013
2. [Establishing External CFD Workflow](#), December 2013
3. [Develop and Calibrate a Data Verification Process for External CFD Simulations](#), March 2014
4. [External CFD Simulation & Field Validation for Selected Building](#), October 2014
5. [Summary & Conclusion of Project Phase 1 - External CFD](#), December 2014
6. [Literature Review of Internal CFD](#), August 2014
7. [Development of an Internal CFD Work Process](#), March 2015
8. [Development of Data Verification Process for Internal CFD Simulations](#), January 2015
9. [Internal CFD Simulation & Field Verification](#), April 2015
10. [Summary & Conclusion of Project Phase 2 - Internal CFD](#), April 2015
11. [Test Set-up & Prototyping of Natural Ventilation Enhancement Technologies](#), August 2015
12. [Generic CFD Workflow for Comfort Assessment](#), August 2015
13. [Parametric CFD Investigations of Comfort & Environmental Conditions](#), August 2015
14. [Development of Comfort Assessment & Occupant Comfort Findings](#), December 2015
15. [Summary & Conclusion of Project Phase 3 Occupant Comfort in Naturally Ventilated Spaces](#), December 2015

### **PRESENTATIONS:**

1. 2014, M.J. Zapka, T. Tran, [CFD Applied Research at the University of Hawaii to Optimize Air Movement and Occupant Comfort in Naturally Ventilated Buildings](#), Presented to Professor Bert Blocken of Eindhoven University of Technology, June 30.