Performance Evaluation and Field Testing of Gas Heat Pump (GHP)

Increase:
- in interest of utilities in natural gas business
- in demand and supply of GHPs
- in potential in commercial and residential sectors

Rajeev Kamal
Graduate Research Assistant
Clean Energy Research Center
University of South Florida
email: rajeev@mail.usf.edu
Gas Heat Pump

Working of GHP

Source: 2009 BE Air Conditioning, UK
Performance Evaluation and Field Testing of Gas Heat Pump

Planning Stage
- Requirement definition
  - Remote DAQ system
  - Temperature, Humidity, Gas meter

Implementation
- All system working
  - No

Analysis and Modeling Stage
- Data sync of two DAQ systems
  - Calculation based on the collected data from the field
- Analysis of Collected Data

Performance and Projection
- GHP COP calculations for given conditions
  - COP prediction for different load conditions
  - GHP COP prediction for other location
  - Running cost estimations for GHP and equivalent EHP system under similar conditions

Modeling
- HAP® model for building load and system sizing requirements
  - Model representing the actual site conditions, zones and loading
  - System equivalent to GHP

Screened sensors & instruments
  - Installation and Deployment

Results
Instrumentation- FPU office, Debary, FL
Comparison of Fuel Consumption and Costs with Electric Heat Pumps

Validation and evaluation (w.r.t. an Electrical Heat Pump)

- Compare the running cost of selected GHP vis-à-vis EHP
- Fuel consumption with use of variable displacement compressor
- Reduction in electricity use during peak and off-peak times?

Information is only an example and will vary on actual data for US

Source: http://www.aisin.co.jp/ghp/english/ghp.html
Thank you

Rajeev Kamal\textsuperscript{1}, D. Yogi. Goswami\textsuperscript{2}, Chand Jotshi\textsuperscript{3}, Elias K. Stefanakos\textsuperscript{4}, H. A. Ingle\textsuperscript{5}

\textsuperscript{1,2,3,4} Clean Energy Research Center, University of South Florida.
\textsuperscript{5} Department of Mechanical & Aerospace Engineering, University of Florida.