IBPSA Project 1

BIM/GIS and Modelica Framework
for
building and community energy system
design and operation

WP 1.1- Modelica Library for Design and Operation

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Update from WP 1.1 breakout meetings

Library overview

- Library R&D shifted from core development to application and scope extension

Borefield models

- Polytechnique de Montreal and RWTH Aachen are working on validation based on measurements
- Around January 2021, based on validation, prioritization will be done on what other effects to be added (e.g., horizontal distribution pipes)

Interzonal air exchange

- Simpler door model is forthcoming; pending is validation against CONTAM.

Media models

- Refrigerant implementation is still ongoing
- Simplified steam model is in development

Break out groups ML/AI

ML/AI opportunities

- How to use AI to support autonomous modeling based on construction documentation
- Can we propose multiple models for the different applications with parameters and connectors that makes it easy to switch between levels
- Use of AI to determine what to measure at what accuracy to get accurate simulation with white/grey box model.
- How to create black box model that reproduces measured data for later use in experiments or operation.

Break out groups HP

Heat pump models from RWTH Aachen

- Aachen reviewed heat pump models from different Modelica libraries.
- Now works on
  - media model (issue 1180)
  - components (compressor, heat exchangers, etc.)
- Eventually will release
  - grey-box for refrigerant cycle
  - black-box for refrigerant cycle
  - manufacturer tables-based

Break out groups HP

Air to air heat pump model from Polytechnique Montreal

- Similar to current water-to-water but with wet/dry coil.
  - Assumes either wet or dry coil, with UA and UA_waterfilm being parameters.

VRF from Polytechnique Montreal

- Allows any number of evaporators and condensers
- Similar model assumptions as air-to-air heat pump
- Finalizing model now, next is validation.
- Support for simultaneous heating/cooling is future work.