

BESMOD - A Modelica Library for Providing Building Energy System Modules

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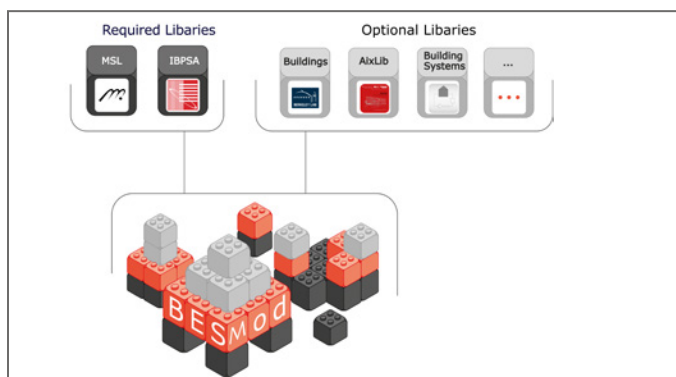


Figure 1. BESMod is build upon required and optional library dependencies.

Simulation based analysis can aid the development of innovative design and control methods towards the integration of renewable energy into a domain-coupled building sector. While Modelica enables the modeling and coupling of different domains, current open-source Modelica libraries mostly provide component models for single domains. No uniform approach for coupling relevant domains within one building energy system exists. Further, coupled system models encompass large equation systems and countless parameters. While existing libraries are user-friendly on component level, no clear approach is presented for simulation and analysis of complex building energy systems.

To close this gap, we present BESMod, an opensource Modelica library, providing a modular approach towards domain-coupled building energy system simulations (cf. Figure 2). BESMod relies on existing component specialized model libraries for the underlying physics (cf. Figure 1). For the analysis of complex system simulations, we propose user-friendly parameterization, consistent model interfaces, precalculated KPIs and debugging options. The library is available at www.github.com/RWTH-EBC/BESMod.

This contribution motivates the need for this library and lays out the interaction with existing model libraries and the library design. We describe the modular approach, the layout for each domain-specific subsystem, and the system aggregation. In addition, we apply continuous integration to secure future modelling standards. An exemplary use case demonstrates the applicability of BESMod, by creating coupled simulations using building envelope models from the Buildings and AixLib library.

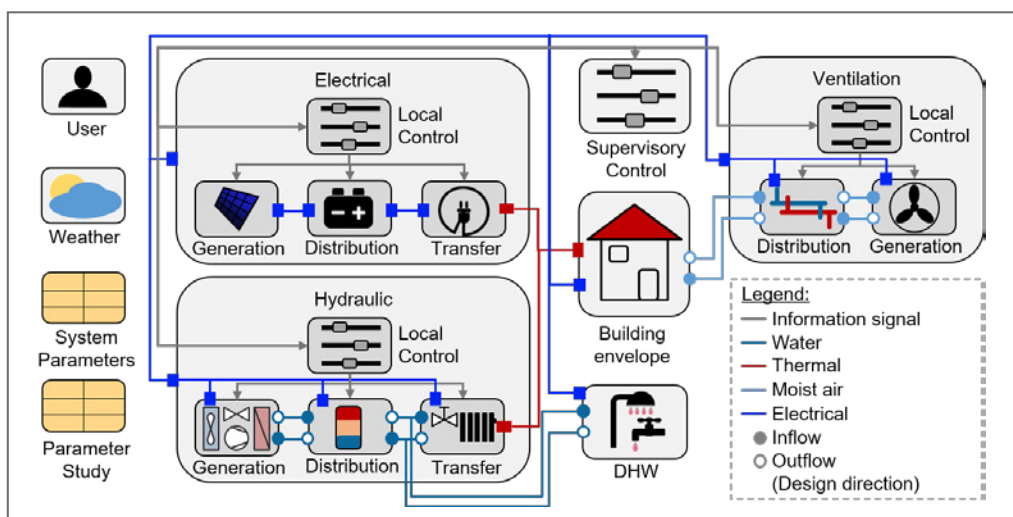


Figure 2. The aggregation of subsystem into the building energy system