AixLib: new, ongoing and upcoming developments

Laura Maier, Christian Vering

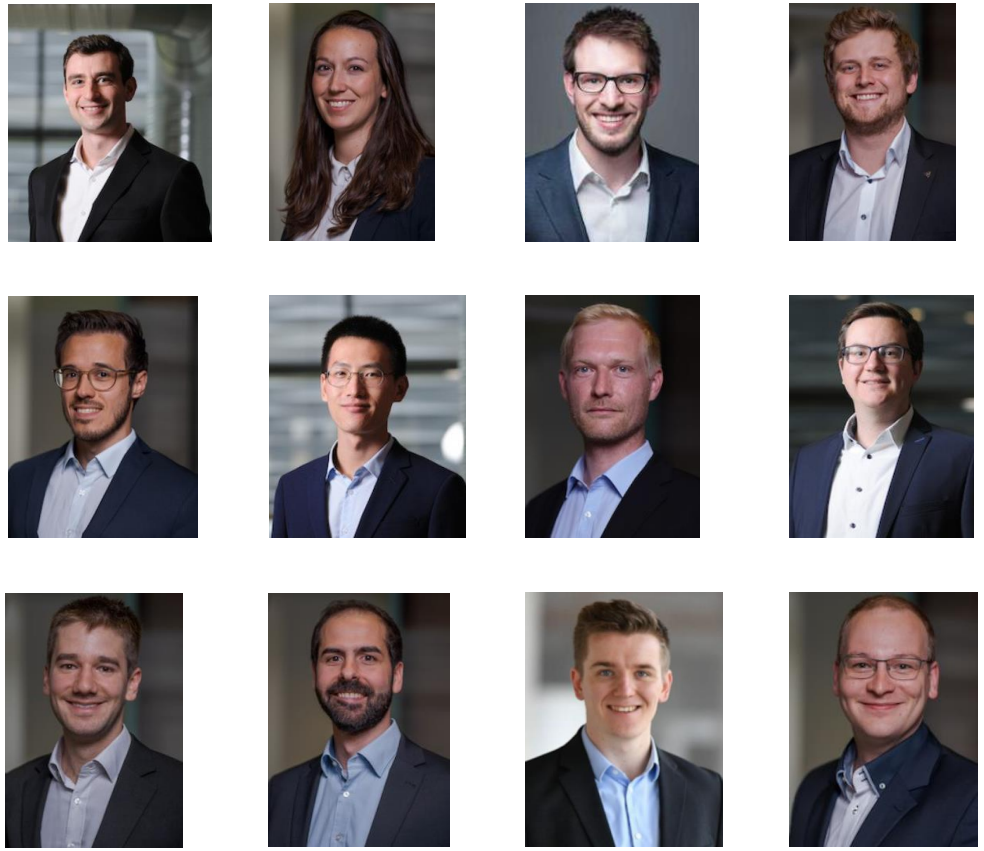
EBC | Institute for Energy Efficient Buildings and Indoor Climate

E.ON Energy Research Center

RWTH AACHEN UNIVERSITY

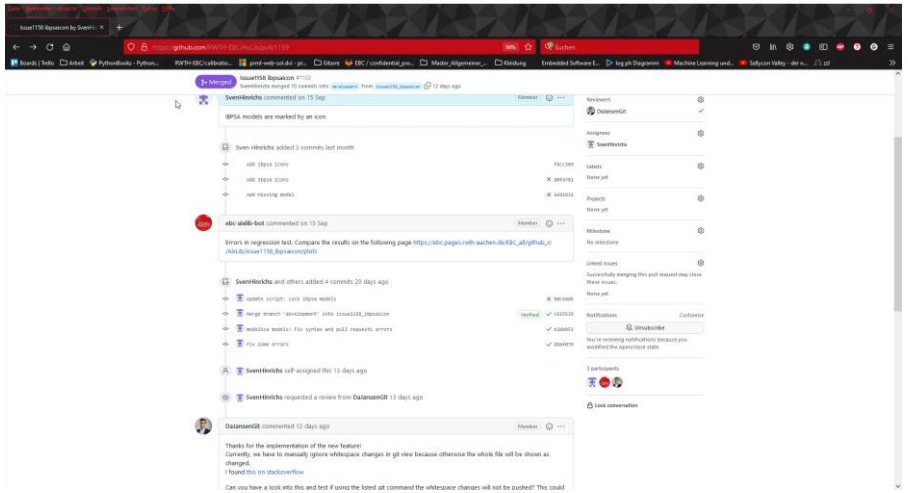
Our developer community is slowly increasing!

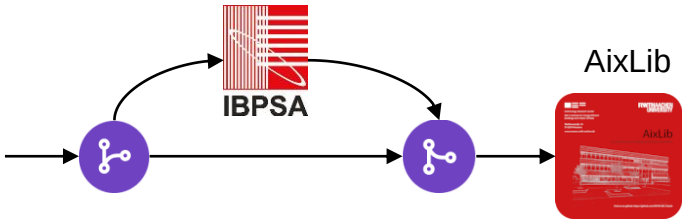
- Even though many experts have left our institute, the interest in AixLib development is not decreasing! ☺
  - Next event: Hacktoberfest on Thursday!
- We now also use Dymola in our course on BES modeling and simulation
  - This attracts more students for e.g. Bachelor or Master Theses
- Plus: Model development has been incorporated in many projects
  - More validation is possible



Done:
New tools of the CI

- Extension of regression tests
  - Automatically creates new reference results if they are missing
  - Updates the reference results with a commit command
- GitLab Pages
  - Artifacts from the last push are compared with existing reference files and visualized
- Automatic IBPSA merge
  - CI registers changes and automatically performs a Pull Request
  - Copies all IBPSA models to the AixLib library
  - Creates a new conversion script and inserts it into the AixLib
  - IBPSA models are set read-only (locked)





IBPSA Merge master #136

Open ebc-aixlib-bot wants to merge 35 commits into `master` from `IBPSA_Merge`

Conversation 0 · Commits 35 · Checks 0 · Files changed 2,818

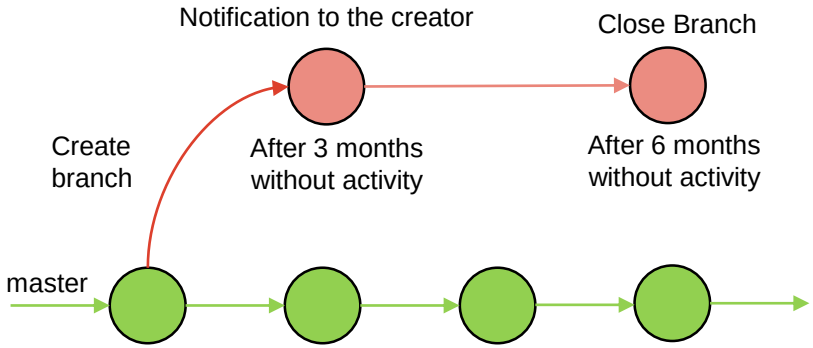
ebc-aixlib-bot commented on 14 Sep — Collaborator

Following you will find the instructions for the IBPSA merge:

1. Please pull this branch IBPSA_Merge to your local repository.
2. As an additional saftey check please open the AixLib library in dymola and check whether errors due to false package orders may have occurred. You do not need to translate the whole library or simulate any models. This was already done by the CI.
3. If you need to fix bugs or perform changes to the models of the AixLib, push these changes using this commit message to prevent to run the automatic IBPSA merge again: `fix errors manually`.
4. You can also output the different reference files between the IBPSA and the AixLib using the CI or perform an automatic update of the referent files which lead to problems. To do this, use one of the following commit messages
   `Trigger CI - give different reference results`
   `Trigger CI - Update reference results`
   The CI outputs the reference files as artifacts in GitLab. To find them go to the triggered pipeline git GitLab and find the artifacts as download on the right site.
5. If the tests in the CI have passed successfully, merge the branch IBPSA_Merge to development branch. **Delete** the Branch IBPSA_Merge

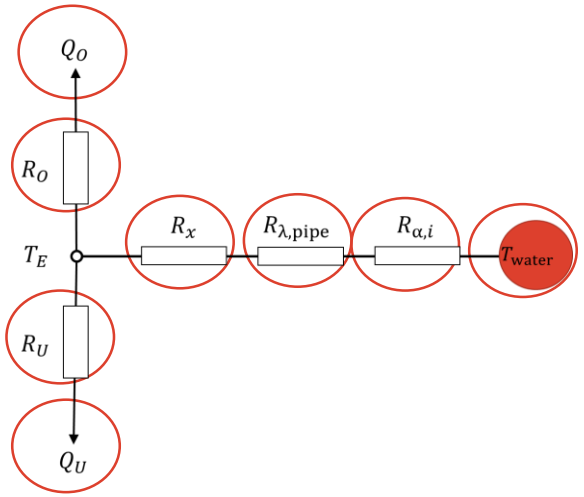
To Do:
CI improvements

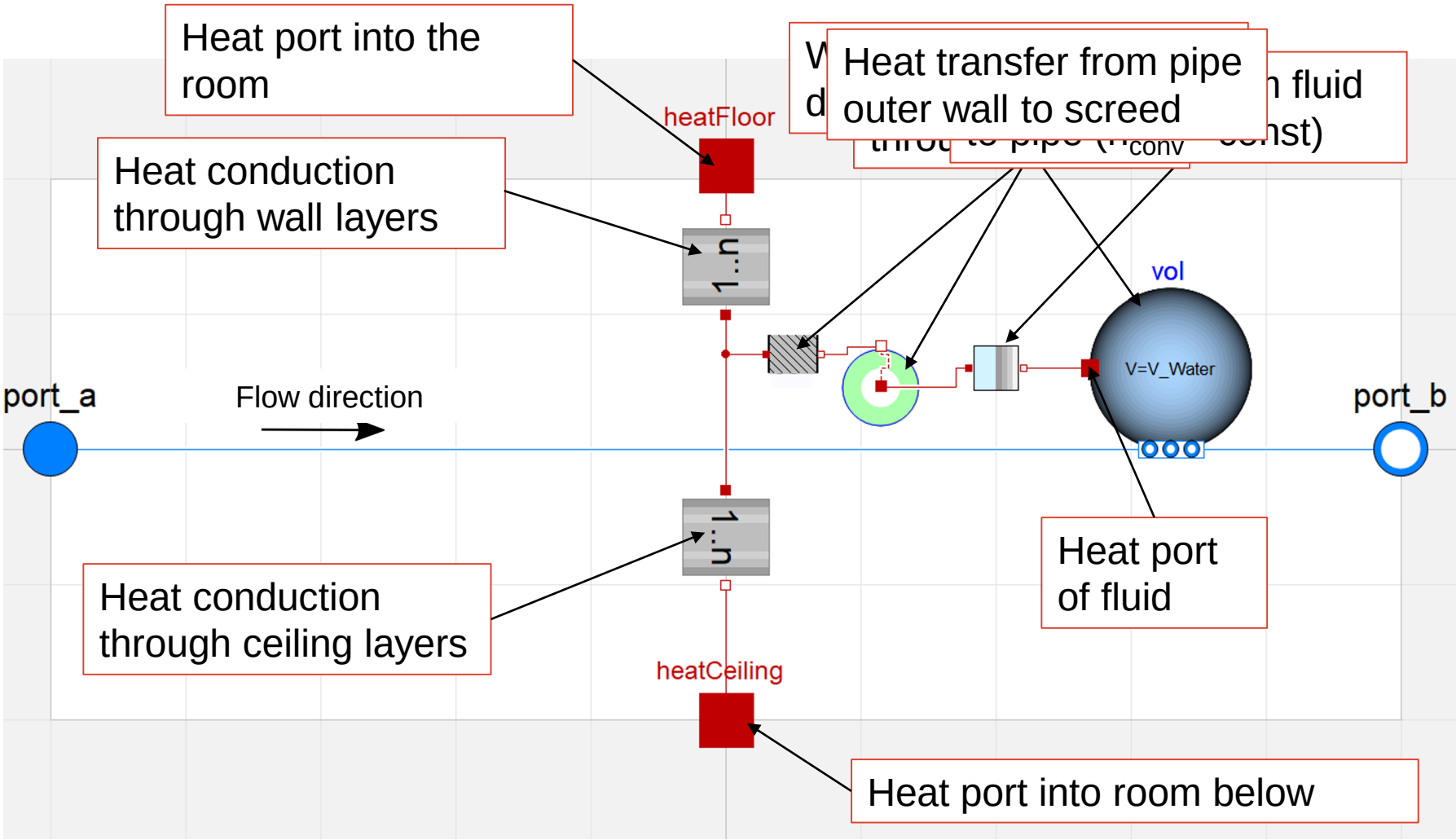
- Extension to other repository
  - Automatic creation of ready to use CI templates for other modelica repositories
  - CI templates are automatically created and included for the repository
- Integration of modelica-fmt [1]
  - Modelica formatter to improve readability
  - Push the improved code to your working branch
- Repository maintains inself
  - 3 months no activity: user is made aware of the branch
  - 6 months no activity: CI Bot closes the branch, but can be opened again at any time



[1] https://github.com/urbanopt/modelica-fmt

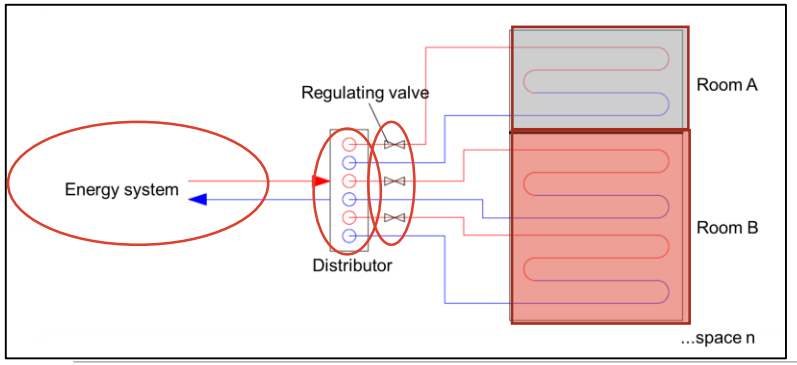
Doing:
Under floor heating - Pipe Element Model

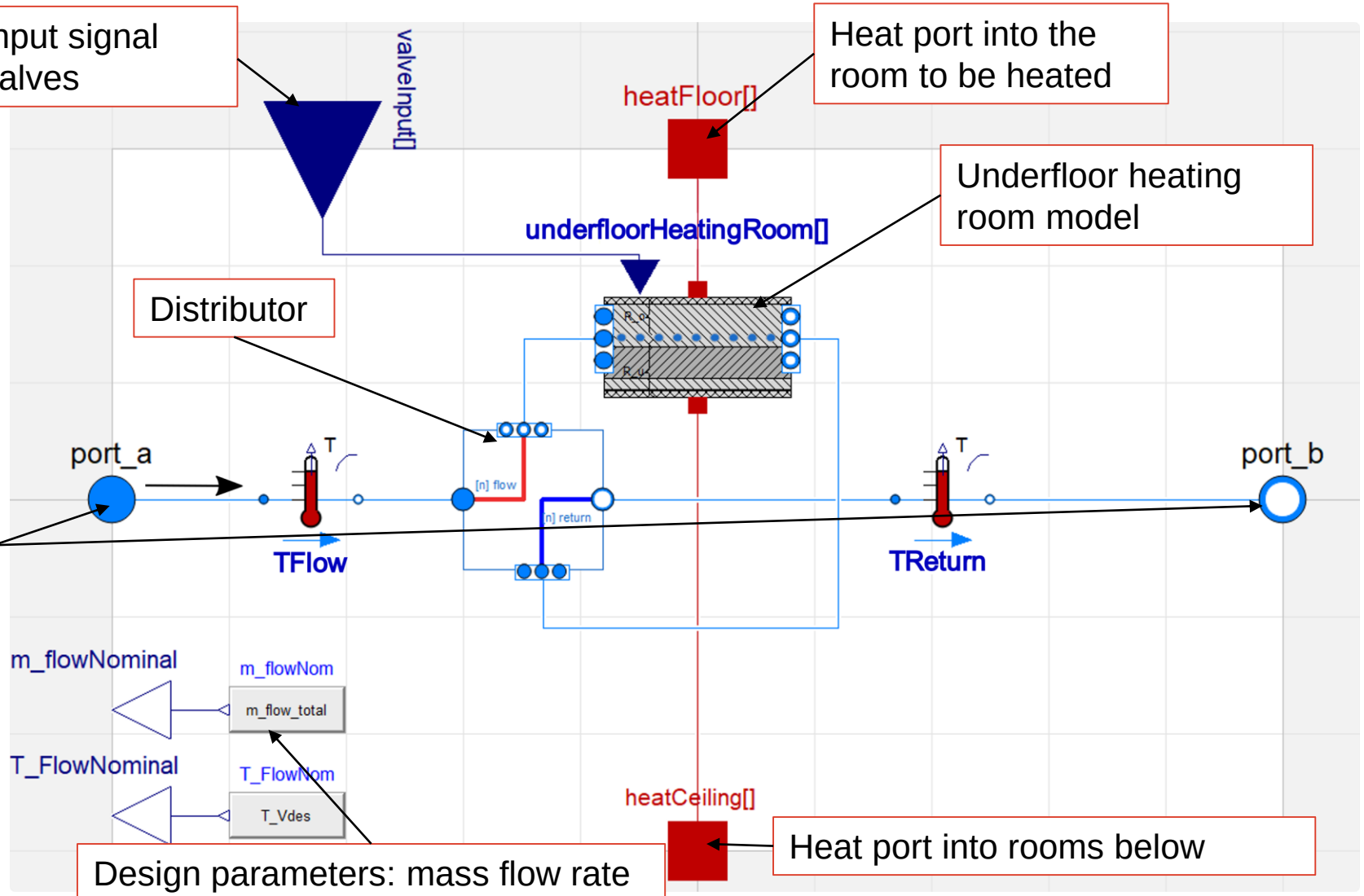




Doing:
Under floor heating system – Basic structure

- Unification of all heating circuits in distributor
- Design according to standard
- Hydraulic connection of energy system



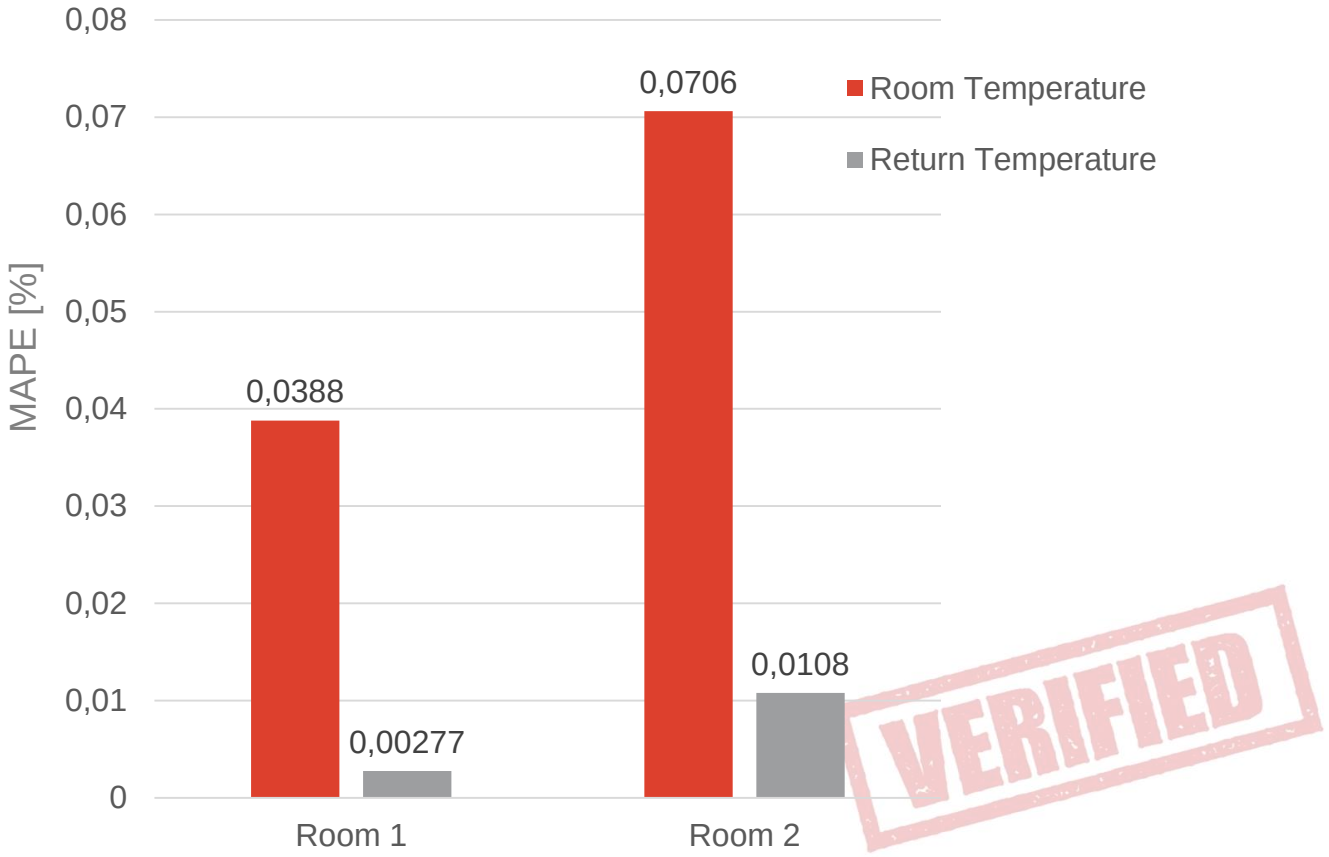


E.ON Energy Research Center | RWTH AACHEN UNIVERSITY

ISO 9000: "Confirmation by objective evidence that requirements are met".

- Connection to two different rooms
- No regulating valve
- Constant mass flow
- Constant flow temperature

} Design parameters

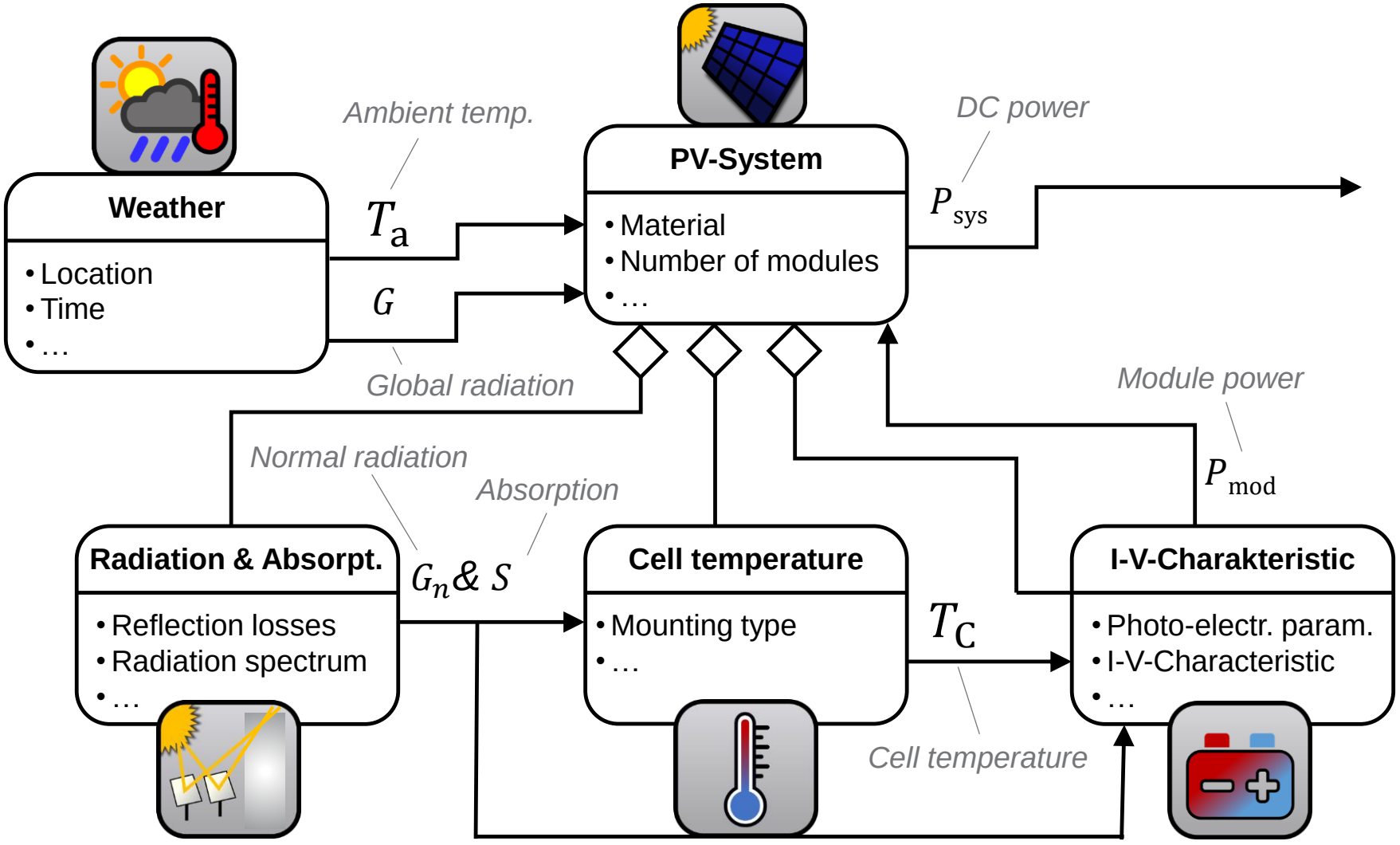


Room 1:
spec. heating load 100 W/m²

Room 2:
spec. heating load 50 W/m²

Methodology – Modeling framework

- Model is easy to parameterize
  - Typical information in technical data sheets was used as parameter base
- The mounting has a huge influence on the system‘s performance
  - We included different popular cell temperature approaches to consider the effects
- Further details in breakout-session 2 WP1.1



Upcoming:
New research paper for AixLib presentation

- Last paper which focused on presenting the AixLib is from 2016 and only a conference paper

- Aim of paper:
  - Summarize developments of last years

- Intended content:
  - Show different levels of detail, which can be simulated using AixLib models
    - e.g. detailed Heat pump System vs. simplified Building model
  - Focus on interconnected systems with PV power plant and grid connection
  - Modeling based on easily accessible manufacturer/generic data (Grey Box)

How to cite AixLib

We continuously improve **AixLib** and try to keep the community up-to-date with citable papers:

- AixLib - An Open-Source Modelica Library within the IEA-EBC Annex 60 Framework. Müller D., Lauster M., Constantin A., Fuchs M., Remmen P.. BauSIM 2016, p.3–9, September 2016. link

E.ON Energy Research Center | RWTH AACHEN UNIVERSITY