MPC-FMU Integration Model Version 1

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The current MPC-FMU Integration Model V1 has 4 parts. The MPC_S V1.jl file is the main julia code which contains the entire framework. In the main framework, the starting states of the simulation (including starting battery SOC, PCM hot SOC, PCM cold SOC, indoor temperature etc.) are initialized, and the simulation in loop starts in the following fashion:

1. Gather weather and load schedule data. They are both 1 week long starting from the current timestep. The current resolution is 1 hour.
2. Call the MPC function which will use the weather and load schedule as input, as well as the starting states. The MPC function will return the optimal operational commands for the HP-PCM system and the updated state of PV generation, lighting & plug loads consumed, and battery SOC.
3. Call the FMU with the built in Modelica model through PyCall. The FMU will take the optimal operational commands decided by Julia MPC as input, and through Modelica simulation, it will return the ground truth states such as the SOC of hot and cold PCM, electricity consumption of the HP-PCM system, and indoor temperature, which will be used as input for the Julia MPC at the next iteration.

In the code, there is a much more detailed description for each function in terms of input, output, and functionality. Please refer to the code and I am happy to answer any questions.

The input weather file needed to run this simulation is also uploaded in the folder.

Here are a few things that we should work on:
1. Fix the FMU issues. For more information, please refer to "FMU Issues".
2. Update the reduced order model in Julia and the Modelica simulation model. We should make sure that these 4 models are aligned: actual hardware - WAGO - Modelica simulation - Julia reduced order model. (Fred can work on the reduced order model in Julia)
3. Update the epw file used in the Modelica simulation model. (Daniel from Stanford side can do this)