

## Phase Change Materials ESP-r Modelling Procedure

One of our unique outputs from this project was to produce a procedural document that would enable future researchers to be able to model phase change materials in buildings as we did. As such we have compiled a step-by-step procedural guide on how to input phase change materials into ESP-r in order to carry out simulations.

**Step 1:** Open the model with project manager.

**Step 2:** click >*browse/edit/simulate* (figure 1)

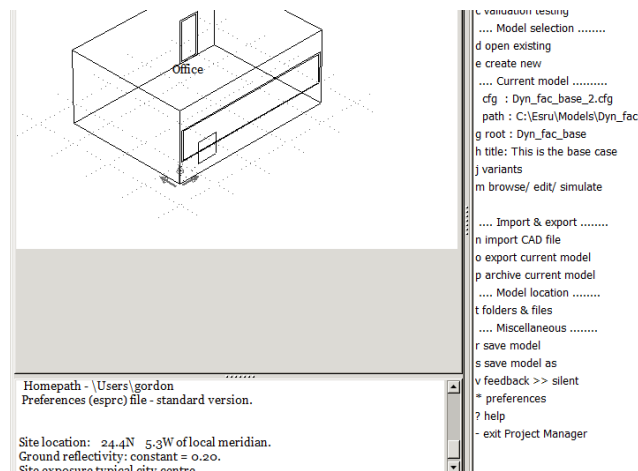


Figure 1

**Step 3:** Once in the browse /edit/simulate menu click >*composition*(figure 2)

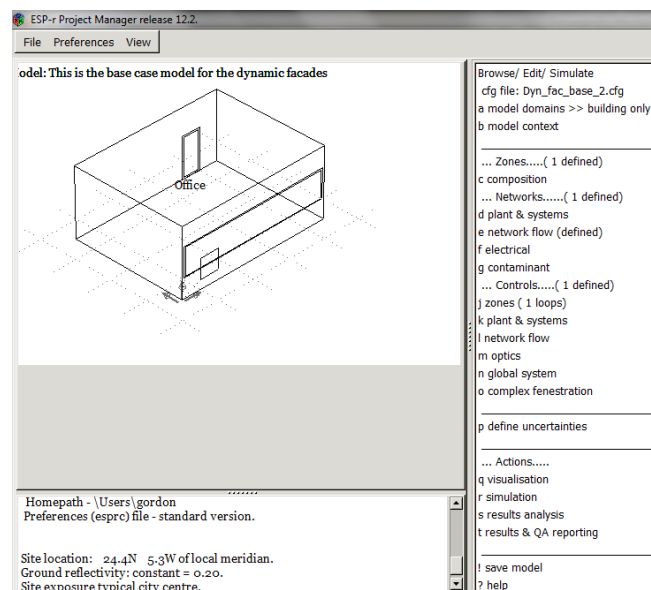


Figure 2

**Step 3:** Once in the composition menu click *>active materials*(figure 3)

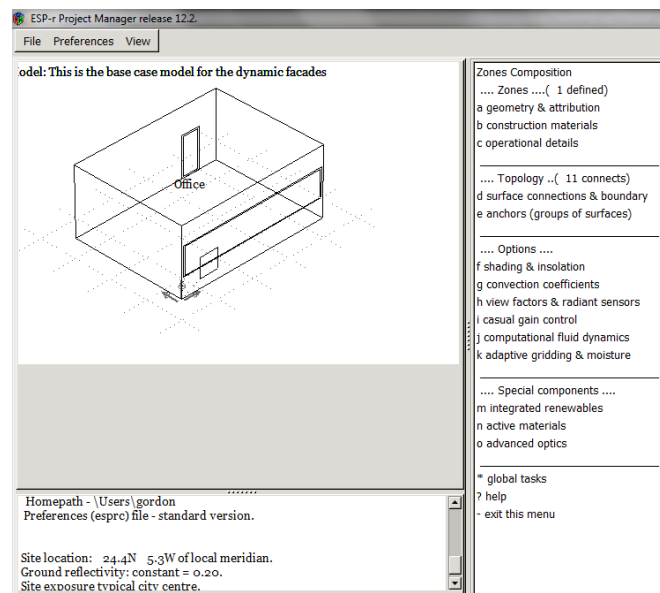


Figure 3

**Step 4:** A pop-up window will then appear asking if a special component file exists, click *>no* (figure 4)

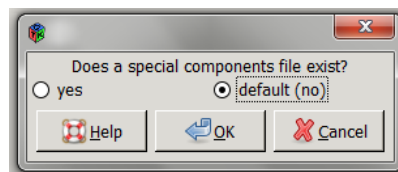


Figure 4

**Step 5:** A second pop-up window will then appear asking if you wish to create a special component file, click *>yes* (figure 5)

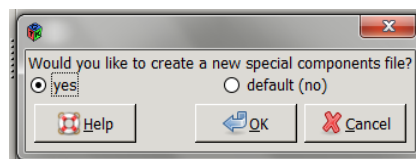


Figure 5

**Step 6:** This special component file then has to be named so that it can be used later in the simulations, this can be named anything you want. Once you have named the file, click *>ok* (figure 6)

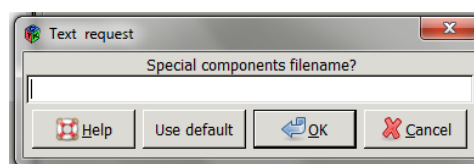


Figure 6

**Step 7:** The programme will then ask you if you wish to input the special component into you building, click *>add/delete items*. (figure 7)

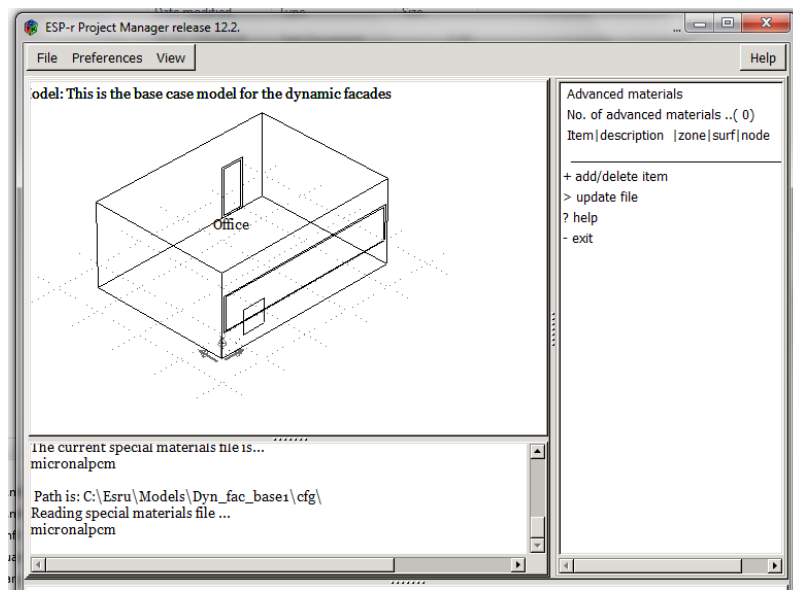


Figure 7

**Step 8:** A pop-up box will then appear asking which action you wish to take, click *>add component* then click *>ok*. (figure 8)

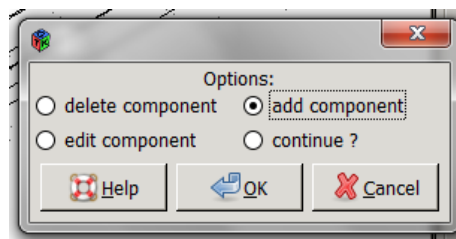


Figure 8

**Step 9:** ESP-r will then list the available components, click *>Phase change materials*. (figure 9)

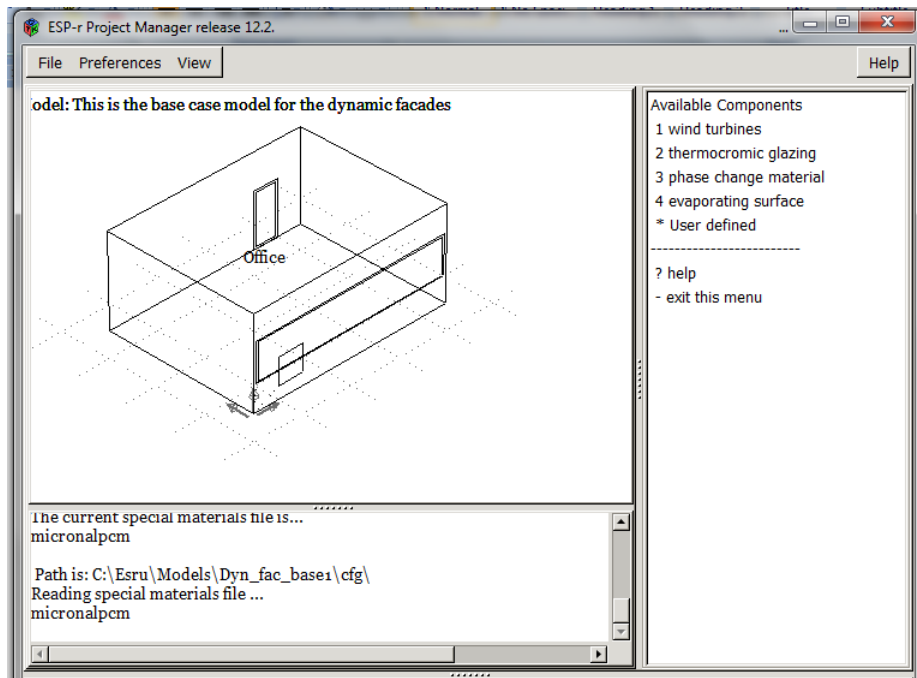


Figure 9

**Step 10:** The software requires the user to input several numerical values in order to simulate the pcm. There are outlined in the images below. Enter each value asked then click >ok after each one. (figure 10).

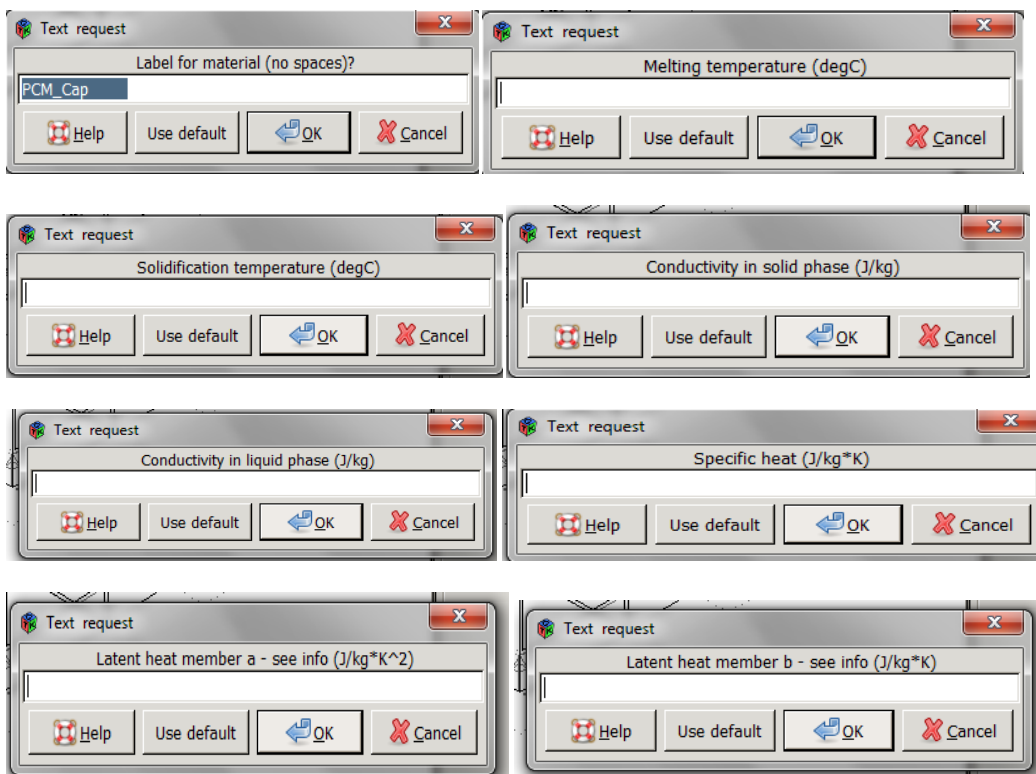


Figure 10

**Step 11:** ESP-r will then ask where you wish to put the phase change material which in our case was the office, therefore click >office. (figure 11)

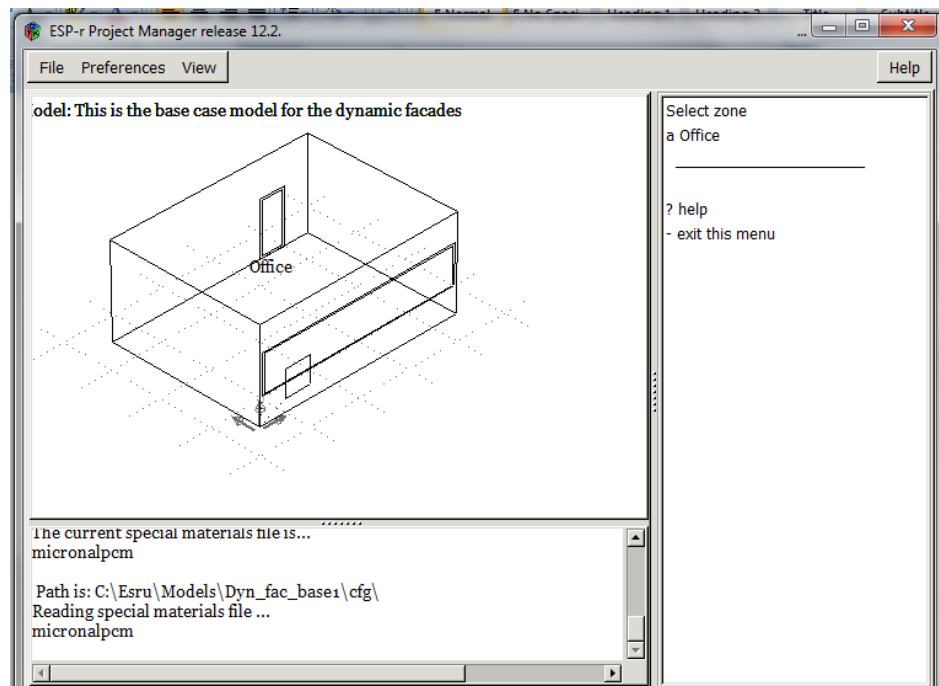


Figure 11

**Step 12:** The user then must choose which area of the room they wish the phase change material to be located in, for our case it was the facade wall but it could be the ceiling or walls etc, so click on the desired location (figure 12).

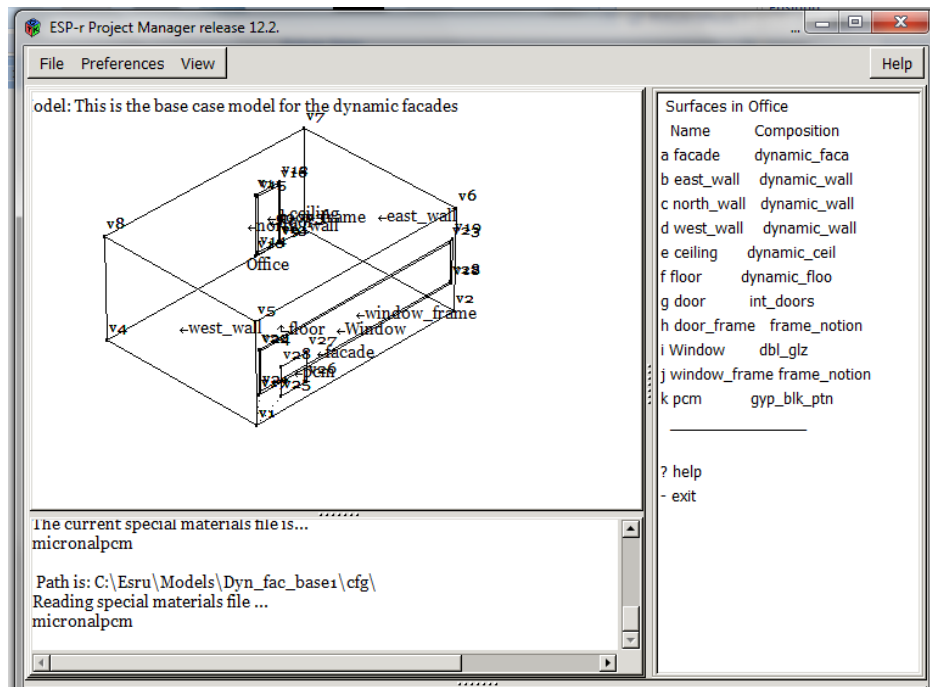


Figure 12

**Step 13:** The programme will then ask in which layer of material within the chosen wall the phase change materials are to be added and this is entirely dependent on the structure of the building. In the case of our project we put it on the innermost layer of material, therefore, click> Layer: 7 *plasterboard* (figure 13).

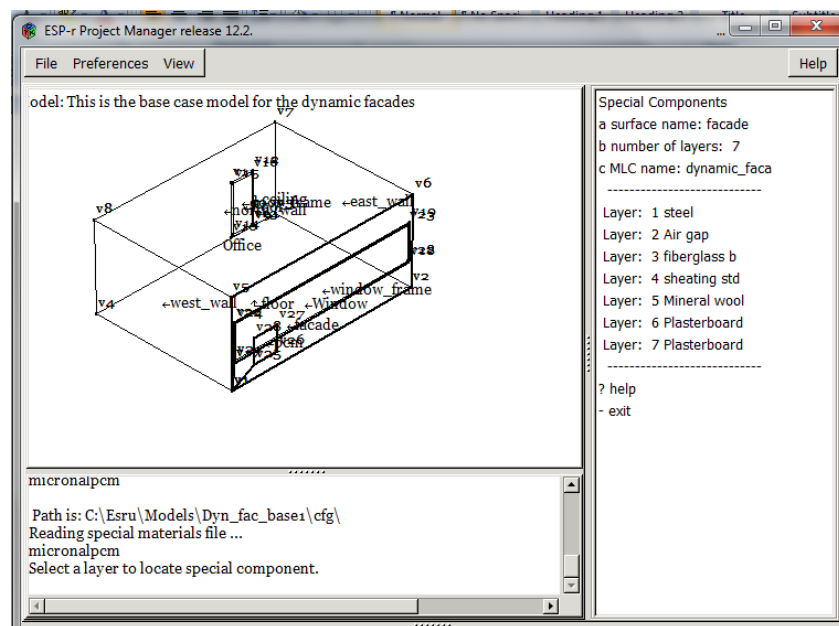


Figure 13

**Step 14:** A pop-up window will then ask which node the phase change material is to be located, each material has three nodes, and outer, a middle and an inner node. The default node will be the middle node, in our case node 14 is the middle node of layer 7, the plasterboard. Once the node has been selected, click >ok.

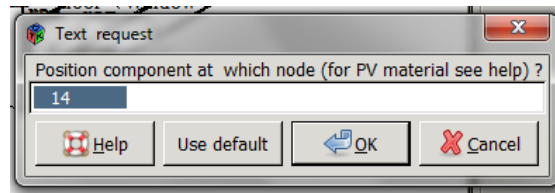


Figure 14

**Step 15:** The phase change material will now appear in the list of active materials and is now available to be used in simulations (figure 15).

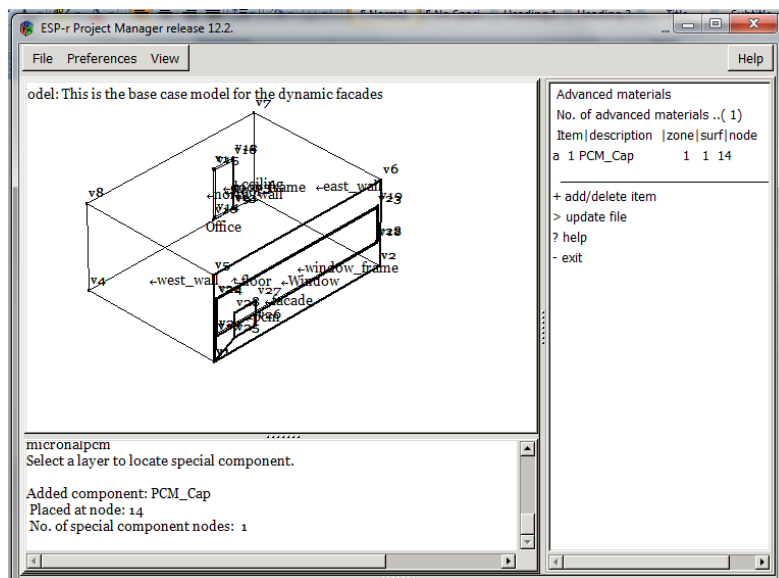


Figure 15