4CBLB00 Solar Heat System

Self-Study Assignment
Group 16

SSA No.	Description
4	Modelling Presentation
SSA Owner	
Pranav Joshi	

Introduction

As the modelling feedback session is taking place on Wednesday (17/09/2025), the required modelling presentation for this meeting has been made in this SSA

Goal

- To work on the Energy Flow Diagram (in the presentation)
- To make a summary of the assumptions made in the current version of the model (for the presentation)

Conclusion

- An energy flow diagram was made (as shown in fig. 5) based on the project manual and online reference ([1])
- A list of assumptions have been made for the same (as shown in fig. 6)

Recommendations

- As suggested by Jasper, the presentation is separated into equal time intervals (2.5 minutes for each half) presented by the respective individual who made the slide.

1 Elaboration

1.1 Requirements for the Modelling Presentation

According to the received email, the following are the requirements for the presentation;

Please prepare a brief **5-minute presentation covering**:

- An **energy flow diagram**
- The **equations and boundary conditions**
- A summary of the **assumptions** made

To make the most of the limited time, **come prepared with specific questions about the physics and structure of your model**. This will help guide the discussion and ensure you receive meaningful feedback.

Figure 1: Requirements of Presentation

Based on these requirements, the work was split between Jasper and myself:

- Jasper : Equations and Boundary Conditions
- Pranav : Energy Flow Diagram and Summary of Assumptions Made

1.2 Understanding and Making an Energy Flow Diagram

According to some basic research ([1]), an energy flow diagram should indicate the direction of the energy flow, the source, and the type of energy that is flowing. It is also noticed that wherever possible, basic energy flow equations or numbers have been used in the examples. These principles will be used to craft an energy flow diagram for the reference system.

Using break.io, a flowchart has been made and looks as follows:

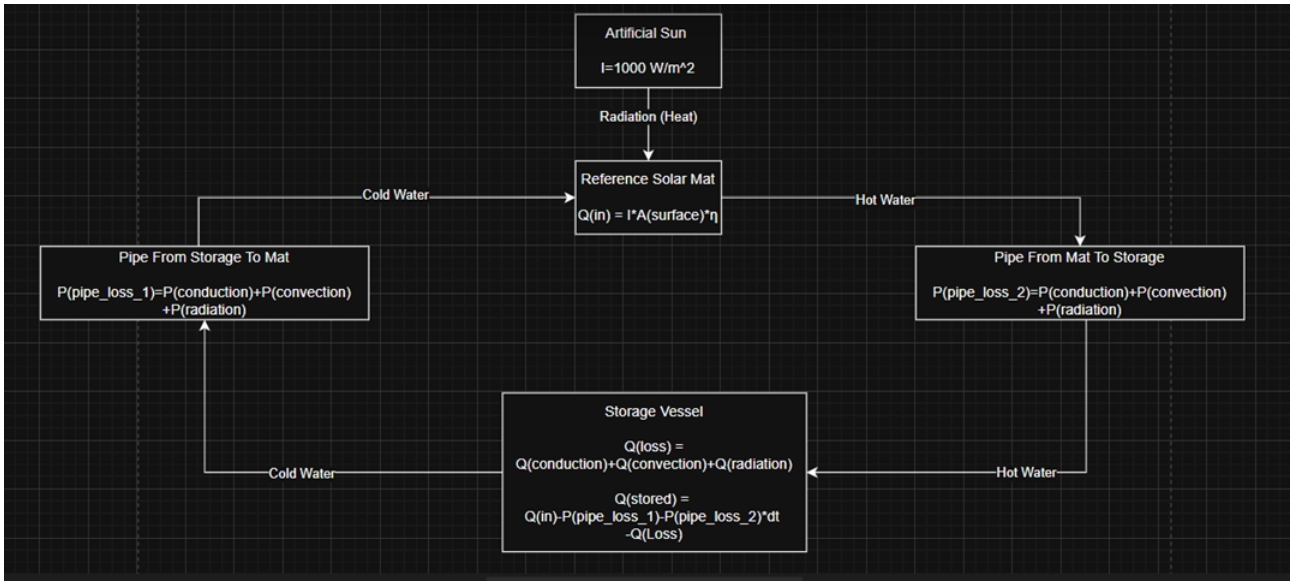

Figure 2: Energy Flow Diagram

The diagram doesn't go into unnecessary detail, but it is deemed sufficient enough to clearly display the intended concept of the model. The arrows clearly indicate the flow of the energy, and they are labelled so as to clarify the method by which energy is being transferred (radiation, pockets of hot/cold water).

The link to this flowchart is the following: `https://drive.google.com/file/d/1x9SgaM-3OcZ3SuX3VvW4vs3s01xOUN_n/view?usp=sharing`

The flowchart looks as follows in the presentation:

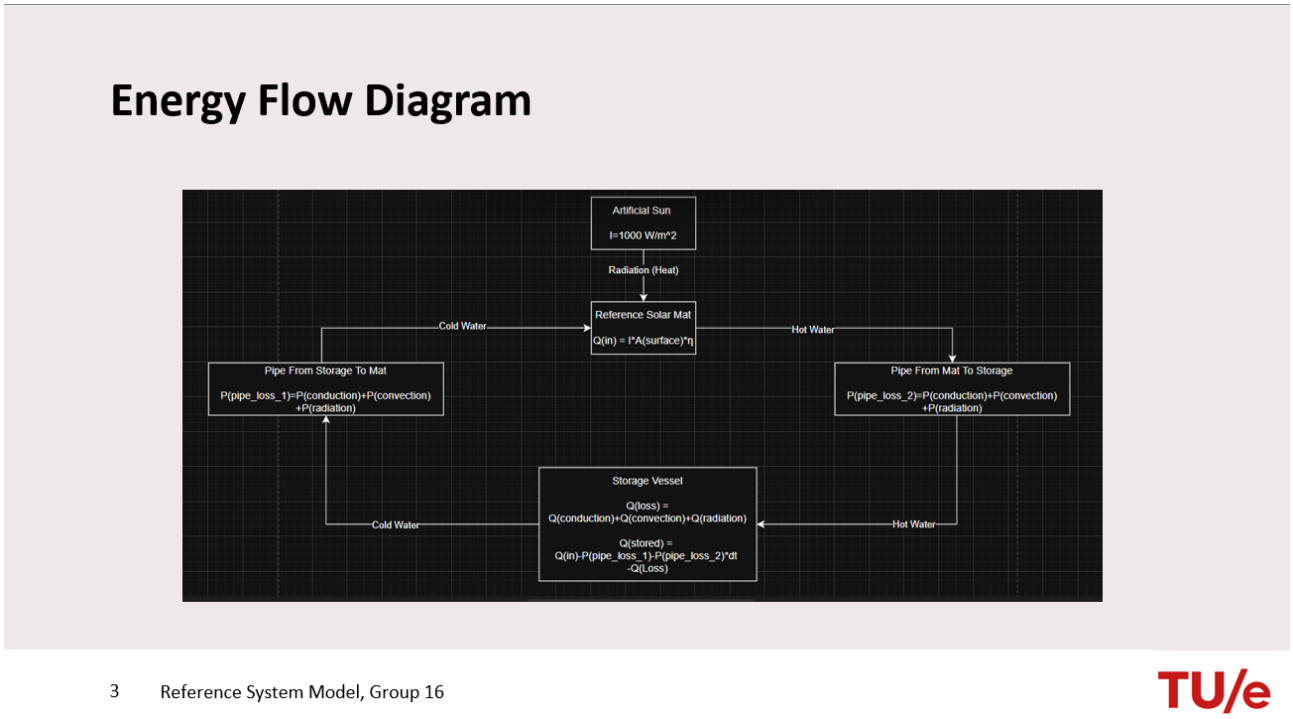

Figure 3: Energy Flow Diagram in Presentation

After discussions with Jasper, and using the energy flow diagram provided in the project manual as reference (shown in fig. 4), adequate modifications were made to include more visual cues, such as the power loss arrows pointing outwards, labelled with the heat loss mechanism. This new energy flow diagram can be seen in fig. 5

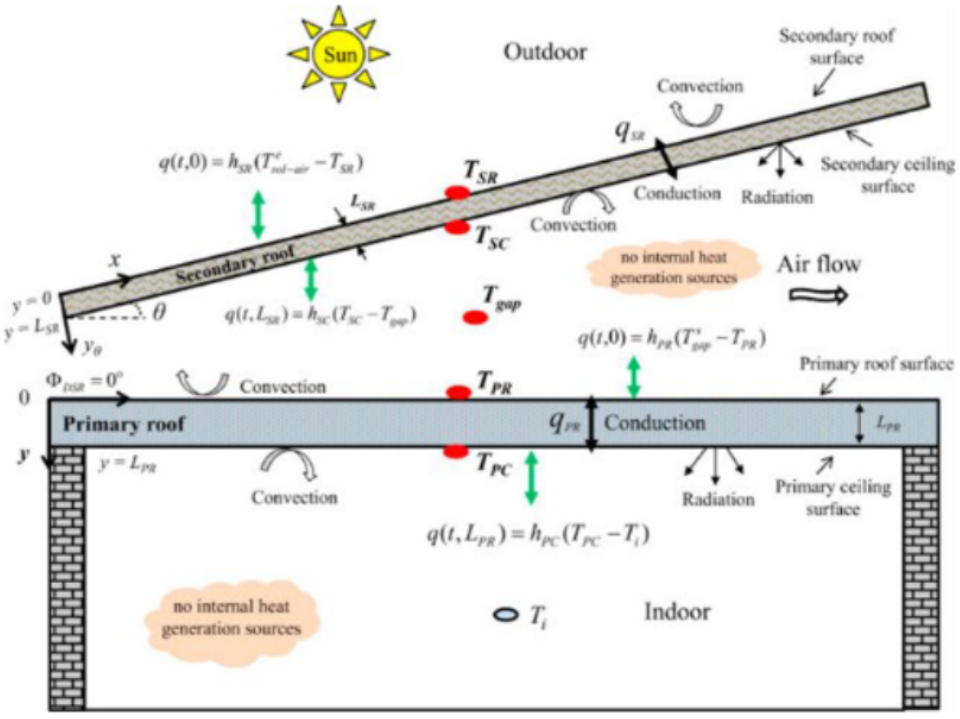

Figure 4: Reference Energy Flow Diagram (in project manual)

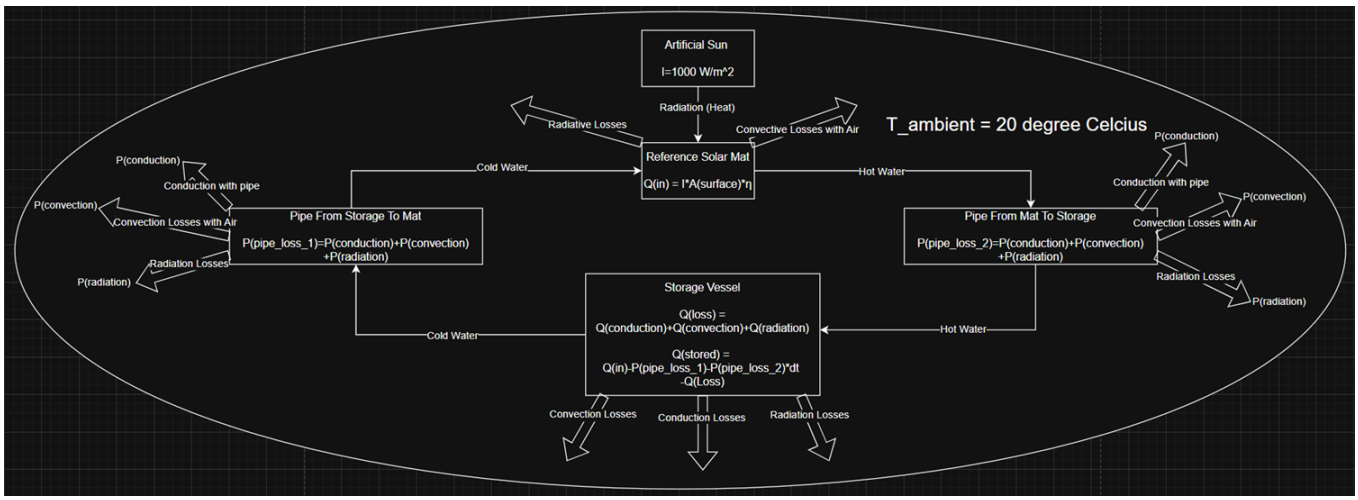

Figure 5: Final Energy Flow Diagram

It is important to note that the image quality is much better in the presentation than in the screenshot shown above.

1.3 Summary of Assumptions

The assumptions made while crafting the model have been taken from Julius' SSA 2, Jasper's SSA 2,3 and finally my 3rd SSA. They are listed as follows:

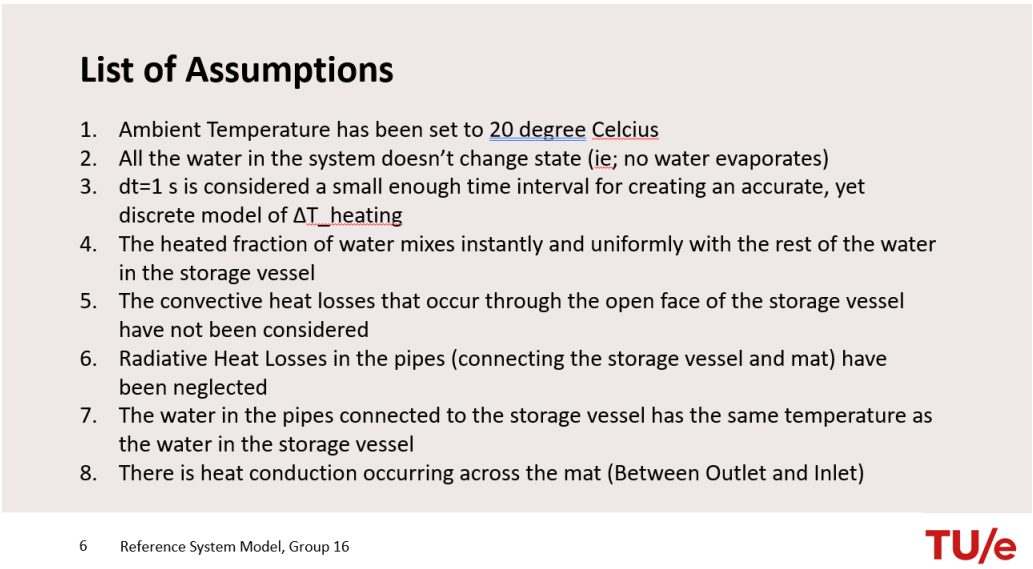

Figure 6: List of Assumptions

This list was cross-checked by Jasper, and point 8 was fine-tuned to state:

- *There is heat conduction occurring through the pipes in the mat (due to temperature difference between inlet and outlet)*

Overleaf Link to this SSA

`https://www.overleaf.com/read/ncydxyvdtkmz#7cbb1f`

References

[1] *What is and Energy Flow Diagram?* URL: `https://chartexpo.com/blog/energy-flow-diagram`. (accessed: 15.09.2025).