Carl von Ossietzky
Universität
Oldenburg

Renewable Energy Heat

WiSe 2023-2024

Dr. Herena Torio

Agenda

- Learning outcomes
- Timeplan
- Seminar Structure
- The course content and tools
- The exam

Learning outcomes for RE Heat

- Understand the operation principles of **main components** (solar cooling, solar thermal and heat pump technologies) of thermal systems and **physical principles** governing it

- Understand the main **parameters** used for characterizing thermal systems behaviour: their strenghts and weaknesses

- Understand and infer the interplay in the performance of different components to build up a heat supply system

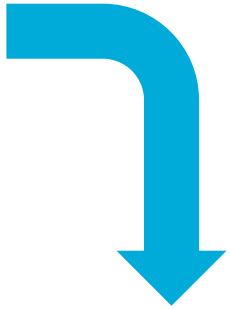
- Understand some typical **control strategies** and **hydraulic configurations**

- Infer the behaviour of a given thermal system with changing system parameters (storage size, hydraulic connection,...)

- Sketch appropriate system designs for a given supply purpose

Course structure

Theory
Solar collectors
Collector field and energy demands
Thermal storage
Heat pumps and TDCs
Thermodynamic modelling
Hydraulic scheemes (scheemes of principle)



Application

- Small exercises
- Programming tasks
- Parametric study

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Timeline

Date	Topic - The lecture
19.10	Introduction to Course + The heat transition: Low temperature energy demands and heat supply systems
26.10	Solar thermal collectors (STC)
2.11	Heat energy demands and heat sources (Solar collector fields and others)
9.11	Storage
16.11	Heat pumps (and TDC chillers) I+ II – thermodynamic processes
23.11	Heat pumps (and TDC chillers) I+ II – thermodynamic processes
30.11	Intro to thermodynamic modelling: self-made system – basic HP network, cool prop diagramm

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Timeline

Date	Topic - The lecture
07.12	Key performance indicators Methods for performance assessment of the **systems**
14.12	Thermodynamic modelling a la carte I: tespy - cornerstones and flexibilities in the software
21.12	Thermodynamic modelling a la carte II: tespy - cornerstones and flexibilities in the software
11.01	Parametric study, min HP+STC, evt. enhancing the sytsem with storage
18.01	Hydraulic scheemes – blessings and pitfalls Systems at work: control and interdependencies
25.01	Systems at work: control and interdependencies Final presentations
01.02	Final presentations and feedback

Course structure

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Dr. Herena Torio
PPRE/UOL

Francesco Witte
DLR-VE

Course structure

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Delivery mode and materials

- Presentations
- Coursware
- Videos…

Weekly deals

- Live sessions with different activities
- Tasks and materials communicated weekly

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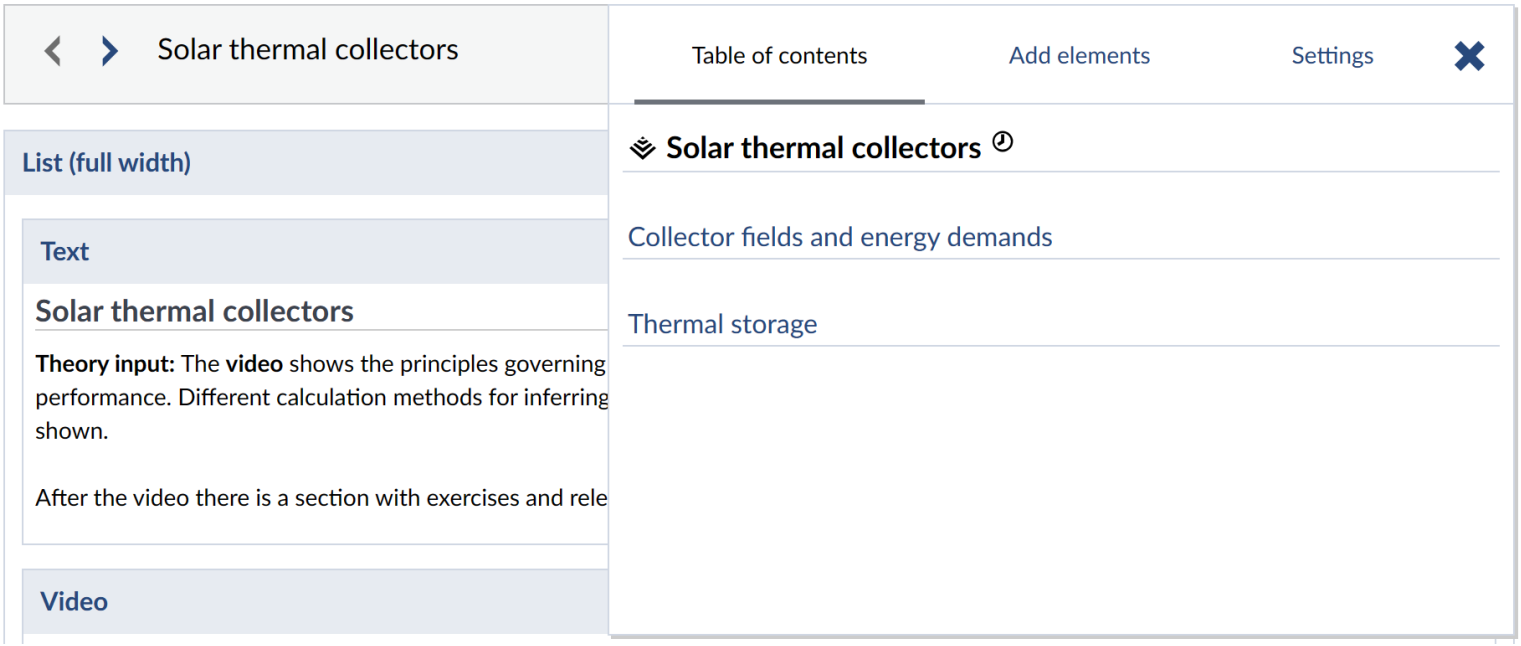
The Coursware



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The Coursware

Solar thermal collectors

Table of contents | Add elements | Settings

List (full width)

Text

Solar thermal collectors

Theory input: The **video** shows the
performance. Different calculation
shown.

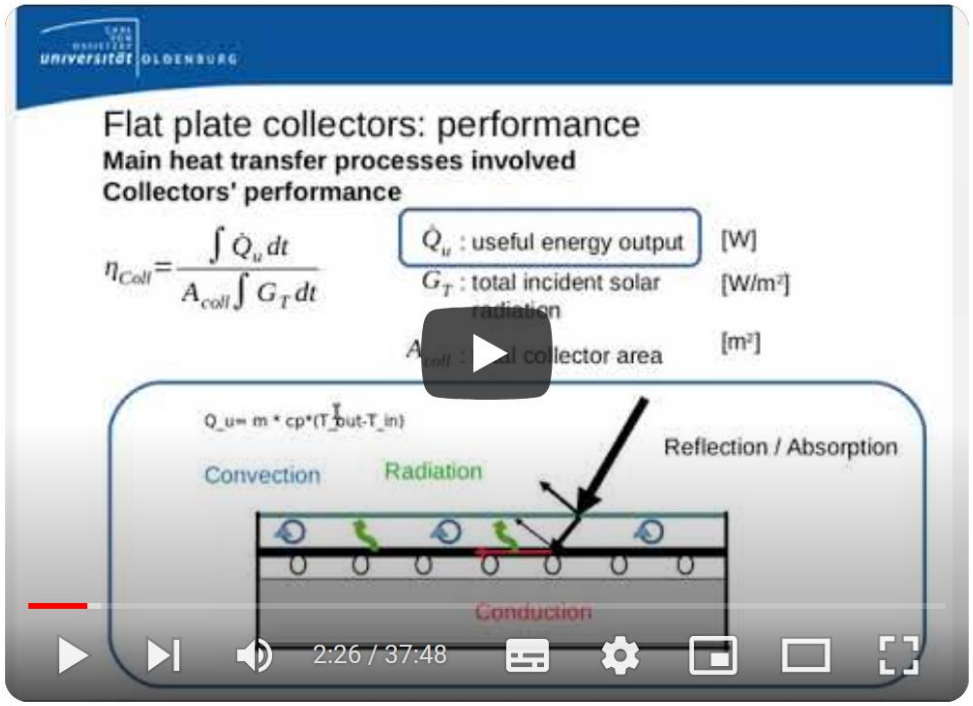
After the video there is a section wi

Video

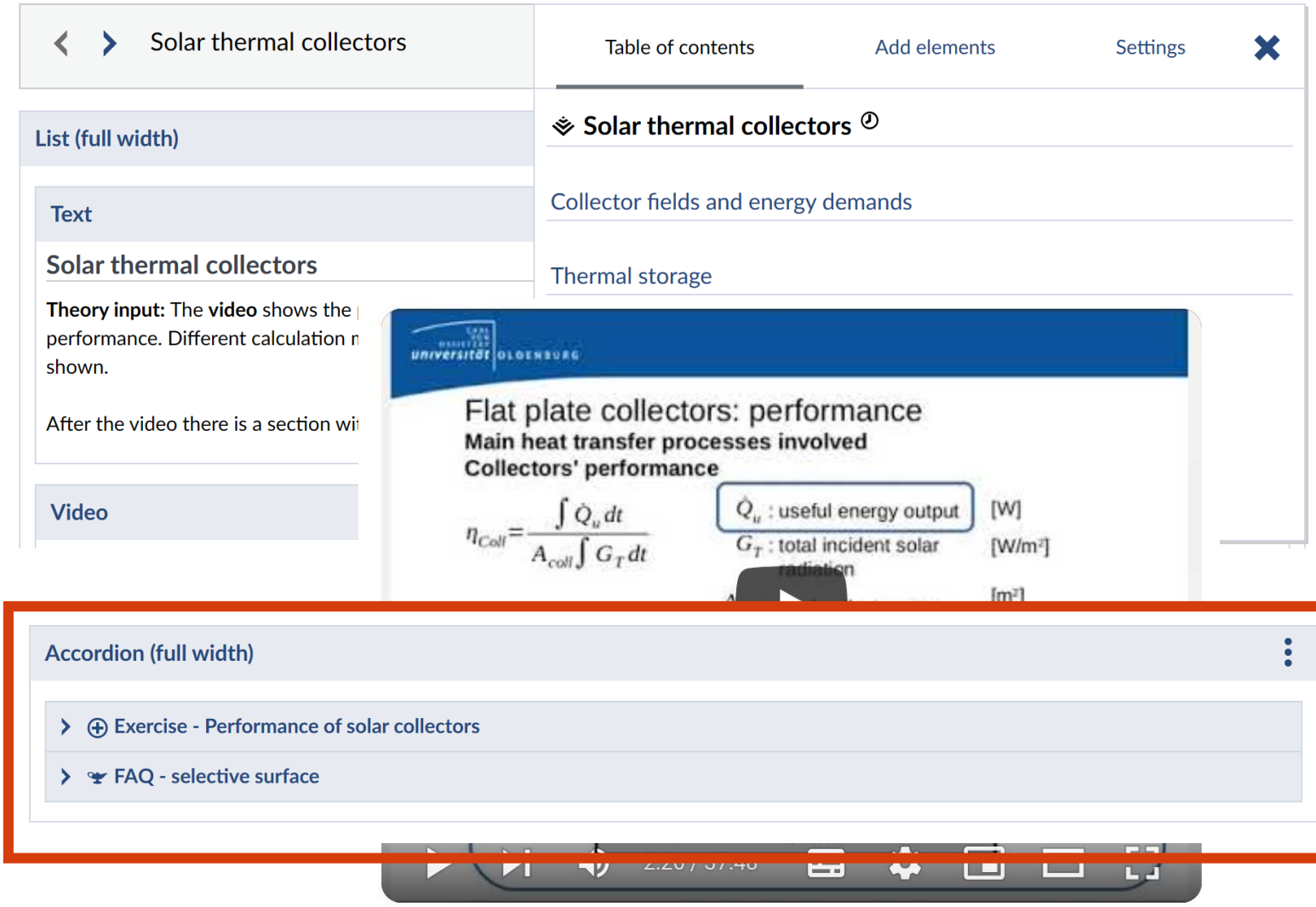
Solar thermal collectors

Collector fields and energy demands

Thermal storage



The Coursware



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The Exam: e-portfolio

E- Portfolio: in groups of 2, **33% each of the items!**

- **Code for parametric study**
  of a system performance

  Deadline: 1 March 2024

- **Poster with your calculation results**
  more info on next slide
  OR
  Short presentation (5-10 minutes)
  at the POSTER SESSION
  You can present the poster or your slide-set

  Deadline: 01. Feb. 2024

- **Expose: Summary of your analysis**
  max. 2 pages explaining main points in the poster / short presentation in more detail

  Deadline: 1 March 2024

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The Exam: e-portfolio

Parametric study:

Define your system

- **Choose** ONE thermal energy demand
- Choose ONE location for that energy demand

- **Define** a meaningful system for supplying the chosen demand
- Draw a system sketch (scheeme of principle) for the system

Calculate ist performance

- **The PARAMETRIC STUDY**: Analyze the performance under different conditions

Analyse your results

- **Analyse** the results about the performance
- Derive **YOUR conclussions** based on the above points
  - Think about limits of your calculations: how representative are they? What are missing points and system dynamics? How important are they?