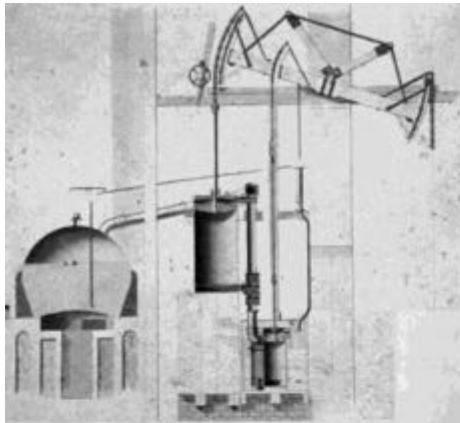


Thermodynamics of Energy Conversion

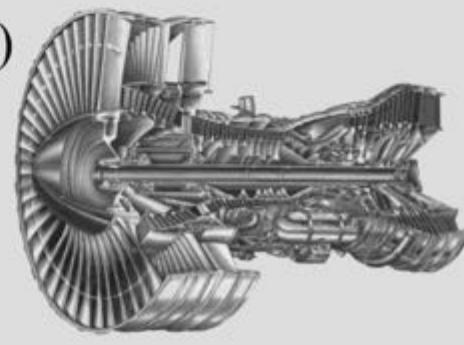


$$\Delta Q = T \cdot \Delta S$$



$$\eta = 1 - \frac{T_u}{T_o}$$

$$S = k \ln(W)$$



Thermodynamics of Energy Conversion

- 1) Introduction, Basics
- 2) Energy demand
- 3) Resources
- 4) Carnot Cycle & Steam engine
- 5) Piston engines
- 6) Turbines
- 7) Nuclear reactors
- 8) Renewable Energy, Solar thermal
- 9) Hydropower
- 10) Windpower
- 11) Photovoltaics
- 12) Geothermal power and Tidal power, Biomass
- 13) Thermoelectricity
- 14) Energy storage

PDFs are available on Moodle

Thermodynamics of energy conversion

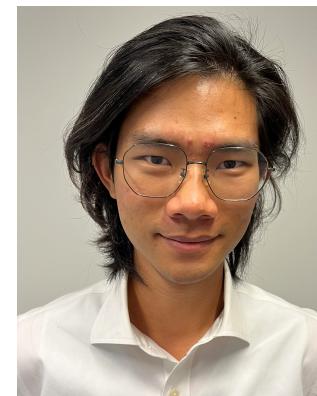
Exercises

Tuesday, 17:00 – 18:00, same room

Exercises at the end of the course

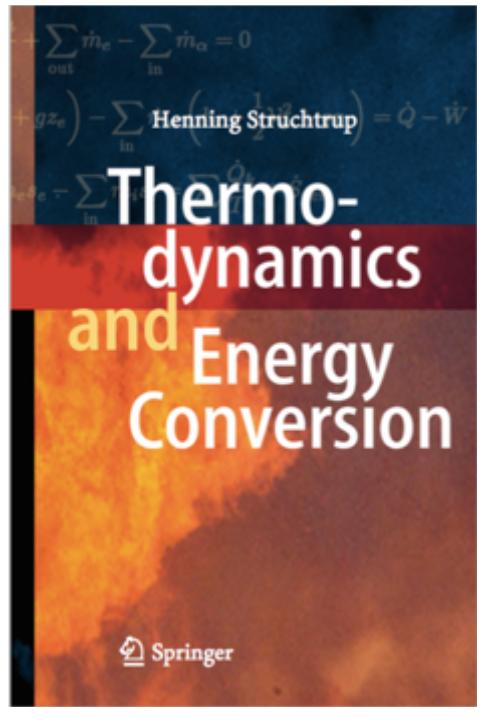
Solutions discussed during the exercise hour

**Exercises close to real life questions,
approximations, estimations, reasoning and
calculations.**

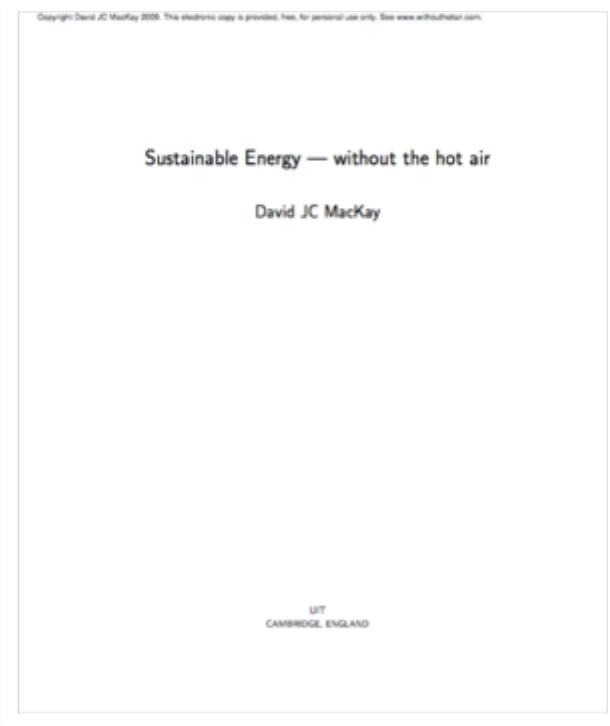


Boyu Ouyang
e: boyu.ouyang@epfl.ch

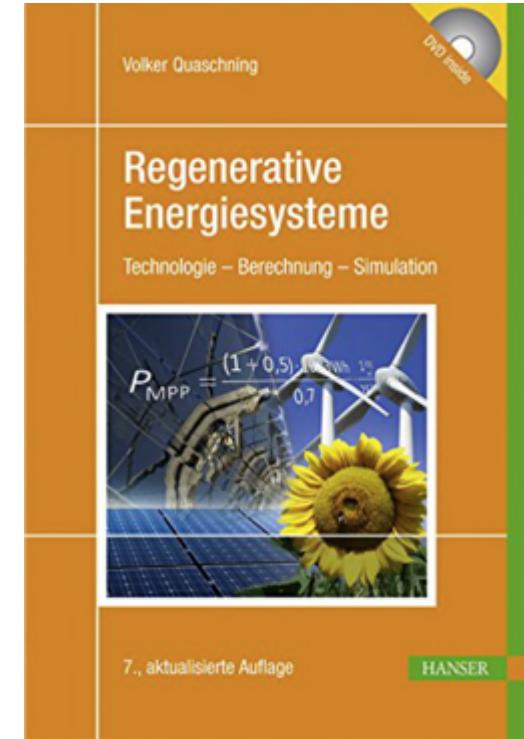
LITERATURE



PDF CHF 54.-
<http://www.hanser-elibrary.com/isbn/9783446427327>

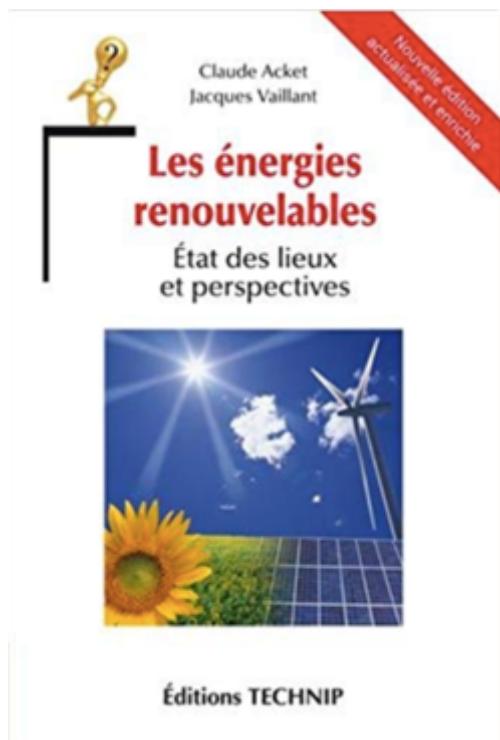


free
<https://www.withouthotair.com>

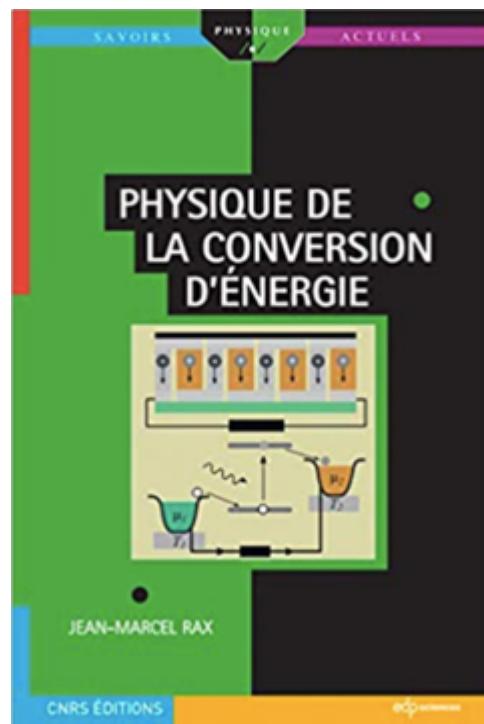


PDF CHF 34.-
<https://www.lehmanns.de/shop/technik/32249702-9783446443334-regenerative-energiesysteme>

LITERATURE (en français)



**Les Energies
Renouvelables** Broché de
Claude Acket (Auteur)



**Physique de la conversion
d'énergie** Broché de Jean-
Marcel Rax (Auteur)



Conversion d'énergie
Broché de Rabah
Touaibi (Auteur)

SUMMARY

The course is an introduction to the energy conversion. It focuses on the thermodynamics of the engines and systems for the conversion of energy from fossil fuels and renewable resources. The relevant aspects of modern energy conversion are treated and the potentials and limitations are estimated.

<https://moodle.epfl.ch/course/>

Learning Outcomes

By the end of the course, the student must be able to:

- Work out / Determine the potential and limitations of the resources
- Describe the various energy conversion technologies
- Explain the thermodynamics of the energy conversion devices
- Analyze the relevant chemical reactions
- Compare technologies and estimate the potential
- Assess / Evaluate the performance of various energy conversion technologies

Exercise solutions given the week after

The ROLE OF THE PROFESSOR

- Teaching a certain topic
- Guide the students in self learning
- Prepare the presentations and improve them continuously
- Give the students homework
- Test the students
- Supports the students if they are unable to find the answer to the question they may have



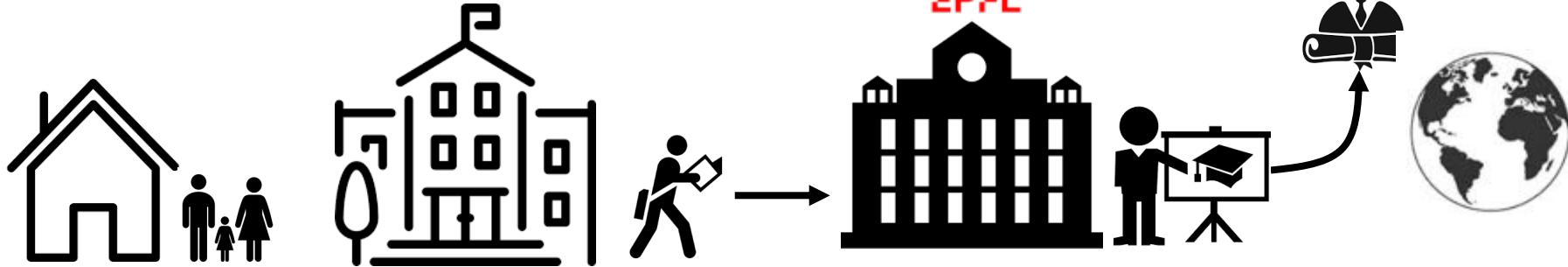
The professor guides you to the summit



The assistant helps you in difficult situation



You have to climb yourself!



HIGH SCHOOL

- children, parents are responsible
- learning in classes
- homework well defined by teacher
- teaching material complete
- teacher reminds you about your responsibilities
- teacher helps to manage responsibility
- prepared for university
- goal is that everybody graduates
- school presence is mandatory

UNIVERSITY

- student, adult
- learning yourself, research
- you define your homework
- Professor defines the framework
- balance your responsibilities yourself
- set your own priorities
- prepared for global competition
- 1/3 graduate, 50% dropout in 1st year
- university presence is up to you

LEARNING METHODE

Lecture 1

The Professor presents the chapter with slides
Slides as PDF available on MOODLE.

Lecture 2

Exercises

The Assistant introduces the exercises and answers the questions of the students.

Course

The student elaborates the context of the course and understands the principals.

Exercises

The student solves the Exercises and learns the applications.



Exam