

## ABOUT THE AUTHOR



Dr Renaud Gicquel is Professor at the École des Mines de Paris (Mines ParisTech), France. He has a special interest and passion for the combination of thermodynamics and energy-powered system education with modern information technology tools and developed various software packages to facilitate the teaching of applied thermodynamics and the simulation of energy systems.

## AUDIENCE

### University Education

Senior undergraduate and graduate university students that already have taken a first year course in Thermodynamics. Energy Systems is designed as an educational tool for courses in applied thermodynamics, energy systems and energy conversion, thermal engineering and related disciplines for students in mechanical, energy, chemical and petroleum engineering.

### Research & Professional Use

For advanced students, researchers and practitioners working in the above-mentioned disciplines or in the engine, automotive, mechanical, refrigeration, energy, oil and gas industry, this book will be a comprehensive technological and methodological reference

### Energy Systems: A New Approach to Engineering Thermodynamics With Thermoptim™ Portal and Software Access

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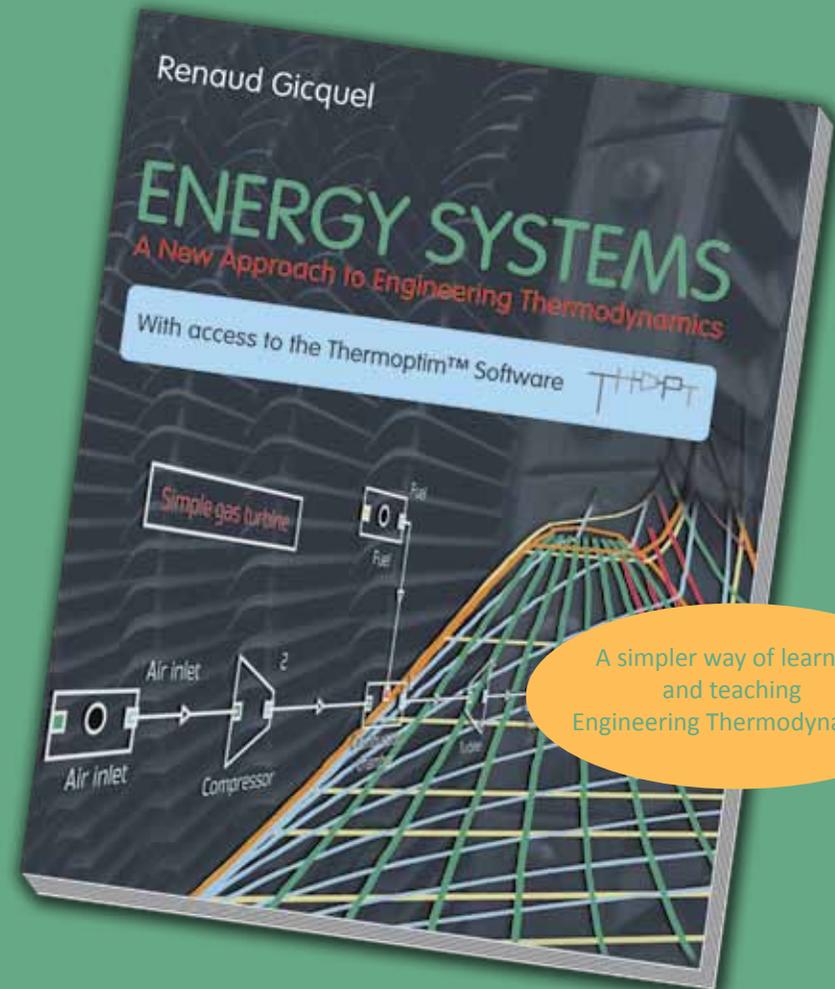
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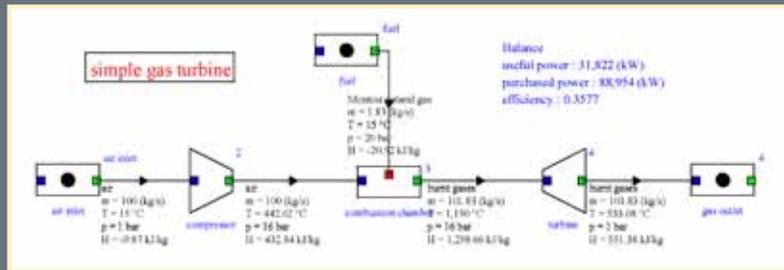
## ABOUT ENERGY SYSTEMS - THERMOPTIM™

Considered as particularly difficult by generations of students and engineers, thermodynamics applied to energy systems can now be taught with an original instruction method. Energy systems applies a completely different approach to multiple energy conversion technologies. It aims to create the reader's foundation for understanding and applying the design principles to all kinds of energy cycles, including renewable energy.

Proven to be simpler and more reflective than existing methods, it deals with energy system modeling, instead of thermodynamic foundations. Although its style is drastically different from other textbooks, no concessions is done to coverage: the complete range from basic thermodynamics to the most advanced energy systems is addressed.

The accompanying ThermoOptim™ portal presents the software and manuals plus programming and design tools to solve exercises of all levels of complexity. The reader is explained how to build appropriate real models and can become quickly operational. The portal is user-friendly and offers quick subject overview through e-modules.

Students can freely download the ThermoOptim™ modeling software demo version and extended options are available to lecturers. A professional edition is also available.



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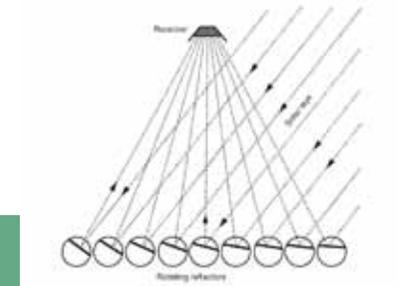
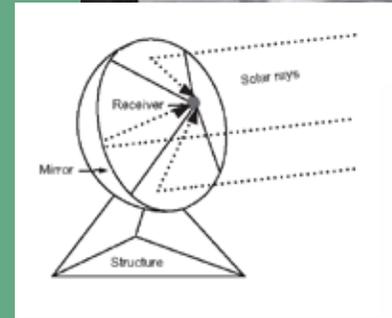
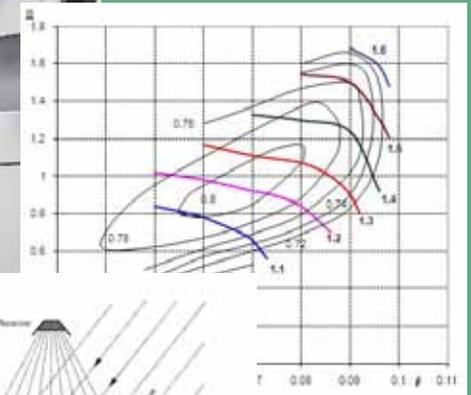
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## KEY FEATURES

- A new educational approach, based on ICT, that encourages students and engineers to focus specifically on conceptual understanding, instead of the thermodynamic foundations and formula. This approach has proven to be successful in France and is currently applied by over 120 higher education institutes.
- A simpler but effective introduction to the subject than existing textbooks provide. At the same time, the approach is effective for advanced students and practitioners thanks to a powerful and open modeling environment, which allows working on real, complex innovative cycles and making sophisticated analyses.
- Access to the Thermoptim™ portal and software, an industrial simulator with full modeling capacity and tutorial, which shows the reader how to build appropriate models to bridge technological reality with theory and allows becoming operational quickly.
- Coverage of many engine types, recent developments and design principles, including gas turbines and combined cycles, aerospace engines, diesel and spark ignition engines, Stirling engines, steam power plants, cogeneration units, refrigeration machines, heat pumps, air conditioning plants, innovative energy converters, new and renewable energies.
- In-depth technological survey of classical as well as innovative cycles, including low environmental impact, providing the capacity to address today's energy problems, and in particular innovative systems with low environmental impact.
- Up-to-date information on energy technologies with many fully modeled examples available for download from the portal.
- A wealth of practical content tools such as conversion factors, mindmaps, e-learning modules, examples, exercises, references, further reading recommendations and a detailed subject index. With International Units (SI).



## RESOURCES

Online resources for instructors and students can be found at [www.thermoptim.org](http://www.thermoptim.org) and [www.crcpress.com](http://www.crcpress.com)

- Online E-learning modules (Diapasons) for an easy introduction to the main concepts
- Basic examples and 'getting started' guides
- Over 200 worked examples and exercises
- Knowledge mindmaps to assist in browsing through to the book
- Easy linking of book and portal through margin reference codes.
- Extensive web portal with a wealth of information at all levels
- Online keyword and definition glossary

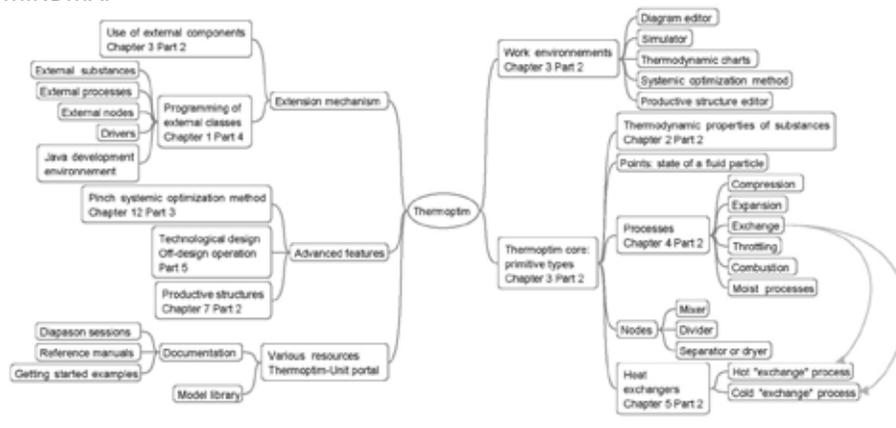
### INSTRUCTOR RESOURCES

- Educational breadcrumbs and mindmaps
- Extended resources on the Thermoptim™ portal, including solutions to exercises and practical work guidance instructions
- Advanced thermodynamic models

### PROFESSIONAL RESOURCES

- Rich coverage of the subject from basic to advanced level
- References and further reading recommendations per chapter give easy access to in-depth subject studies.
- Suited for professional vocational training
- Student's edition of Thermoptim™ gives preview of the professional editions – adopted by many research institutes and companies – which can be purchased. [www.thermoptim.org/sections/logiciels/thermoptim/presentation/differentes-versions](http://www.thermoptim.org/sections/logiciels/thermoptim/presentation/differentes-versions)

## MINDMAP



# THERMOPTIM™ PORTAL AND SOFTWARE

[www.thermoptim.org](http://www.thermoptim.org)

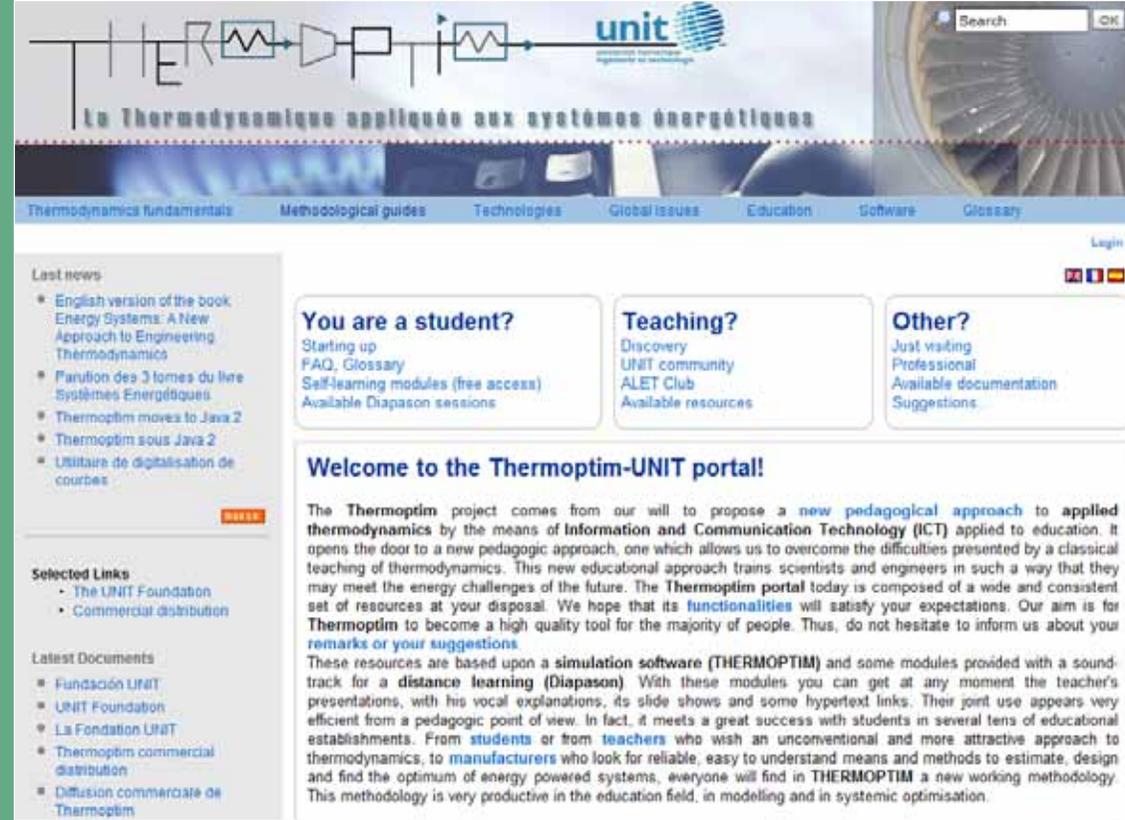
The Thermoptim software allows students to learn thermodynamics without trouble: in parallel to or even before the presentation of the theoretical bases, they can make very practical exercises for real applications, such as a refrigerator or an electricity plant. The results obtained are very realistic, with no impedement by calculation difficulties, as often encountered in engineering thermodynamics.

Thanks to its thermodynamic function libraries, Thermoptim allows one to graphically model simple or complex energy technologies, without writing a single equation, and to get very accurate results which can be visually displayed in various ways.

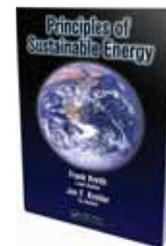
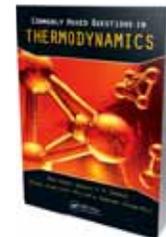


## FEATURES

- Free access to the portal (upon registration for solutions to the exercises)
- Portal In English, French and partly Spanish
- Downloadable student demo software edition in multiple languages (English, French, German, Italian, Portuguese, Spanish, Dutch, Catalan, Chinese)
- Quick keying of book reference codes to get to the subject
- Keyword search engine
- Spoken E-learning modules (Diapason) for quick subject introductions
- Glossary of terms and definitions
- Extended resources for teachers
- Professional versions also available, used by many companies and research institutes worldwide



## RELATED TITLES



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Kreith & Kreider, 2010  
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### The Dynamics of Energy Supply, Conversion and Utilization

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