

**Bibliographic Reference:** Katsaprakakis, D. (2015). Composition of Energy Systems [Undergraduate textbook]. Kallipos, Open Academic Editions. http://dx.doi.org/10.57713/kallipos-651

## Abstract

This book deals with issues related to the combined operation of energy conversion machines. The introductory chapter provides definitions of basic quantities involved in the study of energy systems and, more generally, in energy conversion, such as primary and final energy, total average and instantaneous efficiency of energy engines and systems, etc. It also defines and examines the two basic interconnections of combined operation of energy machines: series connection and parallel connection, for which relationships and basic principles are developed that apply and determine key characteristics of the overall energy system (e.g., overall efficiency, total output and input power, etc.). The book then goes on to examine in detail basic and specific energy systems for centralized or decentralized production, which concern the two main forms of energy consumed by human activities: electricity

and heat. Thus, topics such as the following will be examined: conventional electric power systems from thermoelectric power plants (system composition, unit integration, system stability and safety, operating rules, etc.) · integration of nonguaranteed production units, mainly Renewable Energy Source (RES) technologies, into electricity systems; hybrid RES power stations for electricity or heat production, small and large, optimization of their dimensioning with different criteria (economic or energy) for centralized or decentralized production (e.g., applications in the building sector); cogeneration of electricity and heat. As can be seen, the book aims to present basic and directly applicable methods for optimizing the dimensioning of energy systems and to compare their operation with conventional technologies for large- and small-scale electricity or heat production.



The Project is funded by the National Development Programme 2021-2025 of the Ministry of Education and Religious Affairs and implemented by the Special Account for Research Funds of the National Technical University of Athens and the Hellenic Academic Libraries Link.

