

THERMAL EQUIPMENT POWERED BY ENERGY FROM RENEWABLE SOURCES AND TRANSITION FUELS TOWARDS A SUSTAINABLE ECONOMY

-Summary-

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This habilitation thesis contains a selection of the results of the scientific activity published after 2013, the year in which the author obtained the title of Doctor of Engineering.

Research whose results have been published in ISI or BDI journals are considered. The experimental research took place entirely in testing and research laboratories located within the Technical University of Civil Engineering Bucharest.

- In **Chapter 1**, the scientific activity up to now is briefly presented. The research summary is presented in the following chapters.
- **Chapter 2:** Energy efficiency using solar energy

In this chapter are listed the research carried out on a vending machine, with the refrigerating installation put into operation by solar energy captured by means of photovoltaic panels.

Also, research is pointed out simulating the operation of absorption refrigeration plants, when the generator is fed with hot water prepared in a solar circuit.

The impact of these types of installations on the external environment through carbon dioxide emissions is highlighted.

- **Chapter 3:** Heat exchangers' performance analysis

The chapter includes evaluations based on theoretical and experimental calculations on the basis of which the performance of heat exchangers can be highlighted. Criterion equations and methods used in the analyzes are presented.

Plate heat exchangers and an evaporative condenser were experimentally evaluated.

- **Chapter 4:** Transitional fuels - addition of gaseous fuel from the gas grid with hydrogen. CO₂ emissions.

In this section, the most recent research is presented, regarding the effects of hydrogen addition on the harmful emissions of carbon dioxide from the atmosphere, but also on the general performance of combustion equipment.

The theoretical and experimental research were carried out considering percentages of 10, 20 and 23% respectively hydrogen mixed with methane gas.

- **Chapter 5:** Development plan for the future

It is emphasized the way through which the fields in which the theoretical and experimental activity is carried out are of interest for the future evolution of the research.