

## Summary

The habilitation thesis consists of four parts: **I. Overview of the activities carried out, II. The results of the research activity, III. Plan for the evolution and development of the professional, scientific and academic career and IV. Bibliography.**

**Part I** presents the professional and academic activities carried out after the defense of the doctoral thesis, on October 30, 2009, at the Politehnica University of Timisoara and confirmed by the doctoral diploma with the number 6026 issued on the basis of the Order of the Minister of Education, Research and Youth on November 27, 2009. of research addressed in time were: the development of pilot plants for the production of biogas from different renewable sources, the accomplishment of laboratory determinations for biofuels according to the European norms of standardization in the field, anaerobic fermentation processes on laboratory and pilot scale, with applications in combustion processes and their impact on the environment. They fall into the fields of mechanical engineering and environmental engineering.

The research results were capitalized by publishing a number of 78 papers in specialized journals or in the volumes of national and international conferences and symposiums (of which: 32 in ISI-listed specialty journals, 18 in journals indexed in international databases (BDI) and 28 in the volumes of national and international scientific events), of 5 books as author and co-author in CNCSIS recognized publishers, of a book chapter at a publishing house abroad, of a laboratory tutor and of a national invention patent. I also participated, as coordinator in a project of Young Teams type (PN), and as a research member in the accomplishment of 2 international projects, 6 national projects, and 2 POSDRU projects.

**Part II** represents the core of the thesis, being divided into 3 sections, in which the most important scientific results are described: 1. Representative works that support the thesis, 2. Pilot and laboratory stands for biomass conversion studies and 3 . Experimental determinations and their applications.

The research activity in the field of pilot and laboratory installations development has been a continuous aspect of my work, developed throughout my career so far in the university. This is the basis of all the experimental results obtained and is found in 7 of the 10 articles chosen as relevant for my research activity.

The studies undertaken in the field of renewable energies aimed at developing recipes and testing them on a small scale and then on a pilot scale in order to demonstrate the potential of using waste so far unused in a way that gives a possible pseudo-dependence in the field. use of clean energy at local or regional level.

In this sense I was involved in 2 national research projects, the first, acronym OVAPED CEEEX, which led to the creation of the first pilot stand for testing residual biomass of agricultural nature for obtaining biogas, patented installation with the patent number 122047, "Process and plant for obtaining biogas from biomass ", 2008, and the second, acronym EPOC, project after which a second patented pilot was developed with the patent number 125718, "Biogas production plant from biodegradable municipal waste. ", 2012. In the second patent I am co-author.

The experimental results included all the aspects related to the most accurate determination of the materials produced from the point of view of the laboratory analyzes, before and after the anaerobic fermentation processes, respectively the detailed study of all the process parameters during the tests with the determination of the quantity and quality of the biogas product. Also, the direction of the tests on combustion plants of the produced biogas was approached, respectively the potential of using the biomass used in combustion processes.

**Part III** presents the plan for the evolution and development of the professional, scientific and academic career. The present topics of interest that the author considers, the specific elements of developing the present directions and how they use the research and academic resources, by involving young master's / PhD students in the research activity, respectively, will be presented. for the disciplines the author is in charge with.

The qualification thesis ends with Part IV which contains the bibliographic references associated with the first 3 parts and Annex 1 which contains the list of figures and tables.