

AP25795573. Development of an energy efficient steam electric vacuum heater for domestic and industrial heating. Sc.s. – R.R. Buzyakov

Project Abstract:

The project is aimed at the development and improvement of an energy-efficient thermal device – a steam electro-vacuum heater (SEVH). The operating principle of the device is based on an innovative combination of an electric spiral heating element and radiator heating technologies. The SEVH offers a high energy efficiency (efficiency up to 90%), a service life of over 20 years, and remote control via a handheld remote or smartphone. It is compatible with various sources of electrical energy, including renewables, and is designed for decentralized heating systems in residential and industrial facilities.

The project includes interdisciplinary research in the fields of thermal and electrical engineering, automation, and energy saving. The outcome is expected to be a prototype of a reliable, environmentally friendly, and low-operating-cost heating unit. The development of the SEVH will enhance energy efficiency, reduce CO₂ emissions, and strengthen the position of domestic manufacturers in the energy equipment market. Subsequent commercialization is planned in cooperation with industrial partners.

Project Objective:

To improve the design of the laboratory prototype of an energy-saving heating device based on a steam electro-vacuum heater and to develop a pilot version suitable for use in energy-efficient decentralized heating systems for residential and industrial applications.

Project Tasks:

1. Conduct a scientific review and analysis of existing technologies for residential and industrial electric heaters.
2. Develop the theoretical foundation and a physical-mathematical model of the electro-vacuum heating element's operation.
3. Perform computer simulations and identify optimal engineering solutions for improving the SEVH.
4. Carry out laboratory testing of the SEVH prototype.
5. Refine and enhance the SEVH design.
6. Address interdisciplinary challenges related to improving the electrical circuit, control system, and integration with smart devices.
7. Conduct field testing of the upgraded electro-heater.
8. Develop implementation guidelines for residential and industrial applications.

Date of publication of the material: 01.07.2025