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The publication contains materials of 91th International scientific conference of young scientists and students "Youth scientific achievements to the 21st century Nutrition problem solution".

It was considered the problems of improving existing and creating new energy and resource saving technologies for food production based on modern physical and chemical methods, the use of unconventional raw materials, modern technological and energy saving equipment, improve of efficiency of the enterprises, and also the students research work results for improve quality training of future professionals of the food industry.

The publication is intended for young scientists and researchers who are engaged in definite problems in the food science and industry.

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Видання містить матеріали 91-ї Міжнародної наукової конференції молодих учених, аспірантів і студентів "Наукові здобутки молоді – вирішенню проблем харчування людства у XXI столітті".

Розглянуто проблеми удосконалення існуючих та створення нових енерго- та ресурсоощадних технологій для виробництва харчових продуктів на основі сучасних фізико-хімічних методів, використання нетрадиційної сировини, новітнього технологічного та енергозберігаючого обладнання, підвищення ефективності діяльності підприємств, а також результати науково-дослідних робіт студентів з метою підвищення якості підготовки майбутніх фахівців харчової промисловості.

Розраховано на молодих науковців і дослідників, які займаються означеними проблемами у харчовій науці та промисловості.

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22. The Process of Heat Recovery for Heating a Residential Building

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Introduction. Heat recovery is an essential process that enhances the energy efficiency of residential buildings by reclaiming waste heat and utilizing it to provide heating. This approach not only reduces energy consumption but also minimizes environmental impact.

Materials and Methods. The heat recovery process involves the use of a heat exchanger to transfer thermal energy from exhaust air to incoming fresh air. The primary components used in this study include: heat exchanger (a counter-flow heat exchanger designed for high efficiency), temperature sensors (placed at various points to monitor the temperature changes), air flow meters (to measure the volume of air being moved through the system), insulation materials (to reduce heat loss during the transfer process).

Working solutions for calibration were prepared by systematically adjusting the temperatures of the exhaust and incoming air streams. The calibration process involved multiple iterations to ensure accuracy in the temperature readings and heat transfer efficiency calculations.

Results and Discussion. The increasing focus on sustainable living and energy efficiency necessitates a simple, fast, and reliable method for assessing the performance of heat recovery systems in residential buildings. The objective of this study was to develop a simple, rapid, and highly efficient procedure for the simultaneous recovery of heat in residential buildings using a one-step heat exchange process without additional energy inputs. The heat recovery strategy comprises the isolation and transfer of heat from the exhaust air to the fresh incoming air, thereby maintaining a comfortable indoor temperature while conserving energy.

The effectiveness of different heat exchangers was tested to determine which provided the best performance in terms of heat recovery efficiency. Among the tested exchangers, the counter-flow heat exchanger demonstrated superior performance, recovering up to 90% of the waste heat. This high efficiency is attributed to the optimal design that maximizes the contact area between the two air streams, facilitating better heat transfer.

The efficiency of the heat recovery process was influenced by several factors, including the temperature difference between the incoming and exhaust air, the flow rate of the air, and the thermal properties of the exchanger materials. It was found that maintaining a consistent air flow rate and minimizing heat loss through proper insulation were critical to achieving high efficiency.

To evaluate the applicability of the proposed method, heat recovery systems in several residential buildings were analyzed, and the results were compared with the baseline energy consumption data. The findings indicate a significant reduction in energy consumption, with savings ranging from 30% to 50%.

Conclusions. This study presents a new effective method for heat recovery in residential buildings, focusing on the use of a high-efficiency counter-flow heat exchanger. The simplicity and effectiveness of the procedure make it highly desirable for improving the energy efficiency of residential heating systems. The findings support the use of the recovery systems as a viable solution for reducing energy consumption and promoting sustainable living.