Energy efficiency improvement and CO_2 emission reduction in greenhouse cucumber production

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Abstract

Optimization and management of energy in agriculture is one of the main factors to achieve sustainable development. The aim of this research was to evaluate the impact of improving energy use efficiency on CO_2 emission reduction in the cucumber-production greenhouses in the central region of Isfahan province. Data were collected on a sample of 81 farmers using two-step clustering and proportionate stratification sampling through face-to-face interview, based on a structured questionnaire, and were analyzed by using data envelopment analysis (DEA) approach. Results showed that average input and output energy consumption was 3232.5 and 166.1 GJ/ha, respectively. Fuel and electricity contained the highest energy shares among input energy sources (74.8 and 16.6 %, respectively). Total CO_2 emission was found to be 74941.2 kg /ha, which can be decreased by 45% by following the energy consumption pattern in the efficient greenhouses. In addition, the greatest potential for energy saving is in fuel and electricity consumption patterns. Therefore, adopting sound management and appropriate policies to encourage the farmers in following the efficient greenhouses could lead to a significant reduction in energy consumption and environmental pollution.

Keywords: Energy efficiency, Greenhouse, Data envelopment analysis, CO_2 emission.

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