البحث رقم (7)

عنوان البحث	**التحليل الفني الاقتصادي للتصميم الأمثل للشبكة الوطنية لمحطات طاقة الكتلة الحيوية الزراعية في مصر** **Techno-Economic Analysis for the Optimal Design of a National Network of Agro-Energy Biomass Power Plants in Egypt**
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Extensive studies are conducted to investigate the potential and techno-economic feasibility of bioenergy routes in different countries. However, limited researches have been focused on the whole national agricultural bioenergy resources in Egypt. This research provides an assessment of the potential agricultural biomass resources for electric energy production in Egypt. It provides a strategic perspective for the design of a national network of biomass power plants to utilize the spatially available agricultural residues throughout a country. A comprehensive approach is presented and is applied to Egypt. First, the approach estimates the amount, type, and characteristics of the agricultural residues in each Egyptian governorate. Then, a techno-economic appraisal for locating a set of collection stations, and installing a direct combustion biomass power plant in each governorate is conducted. SAM simulation software is used for the technical and economic appraisals, and preliminary plant capacities are estimated assuming one plant in each governorate. Secondly, a new mixed integer linear programming (MILP) model is proposed and applied to optimally design a biomass supply chain national network to maximize the overall network profit. The network is composed of the collection stations, the potential biomass power plants, and the flow distribution of residues to supply the selected plants. Results indicate that the Egyptian agricultural residue resources can produce 10 million ton/year of dry residues, generate 11 TWh/year, an average levelized cost of electricity (*LCOE*) of 6.77 ¢/kWh, and supply about 5.5% of Egypt's current energy needs. Moreover, the optimization results reveal that a network of 5 biomass power plants with capacities of 460 MW each should be established in Egypt. This approach is thought to be particularly suitable to other developing countries whose energy demand depends on fossil fuels and poses a heavy economic burden, and whose residues are massive, wasted, and not industrialized. The obtained results may also enrich future comparative research that studies the impact and feasibility of implementing agro-residue based biomass electric energy generation.

المرفقات: شواهد تصنيف الدورية.