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Title: Spatial Planning of Biogas Processing Facilities in Greece: The Sunflower's Capabilities and the Waste-to-Bioproducts Approach

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1 **Spatial Planning of Biogas Processing Facilities in Greece: The Sunflower's Capabilities and**  
2 **the Waste-to-Bioproducts Approach**

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11  
12 **Abstract**

13 This study examines the potential contribution to biogas national production, by cultivating  
14 sunflower, using modern techniques, in the plains of the prefecture of Karditsa, Greece. The  
15 main purpose of this study is to determine the potential quantity of biogas that could be  
16 eventually produced in the plains, by applying the latest methods to the cultivation, growth  
17 and harvesting of the sunflower. Using regional and national data, this study ranked the  
18 agricultural areas of the prefecture of Karditsa and created a suitability map on the needs of  
19 the sunflower. The illustrated results provide some support for the future investors or the  
20 present farmers in the area. The developed GIS maps may become a useful tool for the  
21 prediction of the income from the calculated quantity and quality of sunflower crops' seeds  
22 or biogas production. Spatial planning analysis for the determination of the installation of a  
23 biogas' facility centre, where sunflower's derivatives will be processed for ethanol  
24 production was also implemented. On the basis of the results of this research, it can be  
25 concluded that Karditsa's plains have a great potential for producing 3,818 ktoe of biogas  
26 and succeed Greece's 2020's goal on biofuel production (10% of total fuel consumption) by  
27 utilizing the maps and the techniques presented on this study. A supplementary study of  
28 converting waste (household bio-waste) to bioethanol and the future potentials of the  
29 process were illustrated and presented, based on the fact that bio-waste production is and  
30 will continue to increase.

31 **Keywords:** suitability map; sunflower; biogas; bioethanol

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33 **1. Introduction**

34 Having in mind the finite nature of oil in contrast to the infinite resources that earth can  
35 provide, developing methods of employing renewable energy sources in everyday life, has  
36 become the goal for the energy industry and decision makers (Matthew, 2002). The energy  
37 crisis was the main reason that motivated the Brazilian government to lead the biofuel  
38 revolution and make it obligatory to blend anhydrous ethanol with gasoline on regular  
39 gasoline engines (Puerto Rico, 2008). Since 1976 Brazil has become the second greatest

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