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Author: Epameinondas Nikas Aggelos Sotiropoulos George A. Xydis



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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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4 **Epameinondas Nikas¹, Aggelos Sotiropoulos², George A. Xydis^{3*}**

5 ¹Soft Energy Applications & Environmental Protection Lab, Piraeus University of Applied
6 Sciences, P.O. Box, 41046, Athens 12201, Greece

7 ²School of Chemical Engineering, Unit of Environmental Science & Technology, National
8 Technical University of Athens, 9 Iroon Polytechniou Str., Athens, Greece

9 ³Department of Business Development and Technology, Aarhus University, Birk Centerpark
10 15, 7400 Herning, Denmark

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

* Corresponding author. Email: gydis@gmail.com; gydis@btech.au.dk

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