Title: LOCATION-ALLOCATION MODELLING APPROACH FOR WASTE-BASED BIOENERGY

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This study explores how the combination of spatial-analysis techniques with economic and financial tools increases the accuracy of bioenergy economics assessments. The facilities are under-utilized, as we consider only selected feedstocks. The environmental analysis assesses the monetary value of reduced CO2. Finally, the economic analysis shows a higher multiple effect for the single facility scenario, even with lower disposal employment assumptions.

**Overview**

The analytical processes of the study consist of the two main stages. In the first, Identification Stage, decision-making processes are used to identify the set of optimal sites. The second, Evaluation Stage, emphasizes analytical tools to evaluate the selected sites and to test the goodness of the constraints used to identify suitable locations/solutions.

**Stage 1: Solution Selection**

**Technological Selection:** The sites may either rely on a priori assumptions, in which case a technology is "labeled" for its application, or become the objective of the analysis.

**Suitability Analysis:** GIS techniques are used to produce the set of feasible locations for the production sites. The constraints utilized to identify the sites have various spatial specifications and are applied to different layers of geographic data of the study area. The data and respective constraints can be of different types, including physical (e.g., coastal areas), socioeconomic (population density), regulatory (state halves, federal land).

**Location-Allocation:** One of spatial analysis procedures. This stage allows the analyst to select the locations and to assign the existing demand to those locations in an optimal manner according to the set of constraints (see Model Formulation).

**Stage 2: Solution Evaluation**

**Financial Performance:** The stage may incorporate different approaches. In the present analysis we assessed the internal discount rate at which the projects become profitable. The focus of this step is limited to the performance of the project at hand.

**Economic Impacts:** This stage may include different methodologies, from GHG assessment to more sophisticated approaches. We used the former, comparing avoided emissions from implementing the projects against current WMS practices. The impact here increases in size, as effects are on a regional scale.

**Environmental Impact:** The last steps involve the use of I.O. models to assess the capital costs, and in the case of multiple facilities, the economic and financial tools increases the accuracy of bioenergy economics assessments. The facilities are under-utilized, as we consider only selected feedstocks. The environmental analysis assesses the monetary value of reduced CO2. Finally, the economic analysis shows a higher multiple effect for the single facility scenario, even with lower disposal employment assumptions.