

Decision Sciences

Exercise Linear Programming - Recycling solid waste problem

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Problem description

A reclamation center collects four types of solid waste material, treats them and then recycles them into a salable product.

Three product grades are made, based on the proportions of the four materials being used. Grade specifications, recycling costs and selling prices are given in the next slide, together with volumes available weekly and treatment costs of all materials.

Every week, the company receives a € 30,000 grant for treating the materials, if at least half of the available volume is treated for each material. The data are given in the following table:

Table: Grades and materials data for solid waste recycling

Grade	Specs M1	Specs M2	Specs M3	Specs M4	Recycling cost (€/lb)	Selling price (€/lb)
A	$\leq 30\%$	$\geq 40\%$	$\leq 50\%$	$= 20\%$	3	8.5
B	$\leq 50\%$	$\geq 10\%$	-	$= 10\%$	2.5	7
C	$\leq 70\%$	-	-	-	2	5.5

Table: Weekly volume and treatment cost

Material	Weekly volume available (lb)	Treatment cost (€/lb)	Additional restrictions
M1	3000	3 €	
M2	2000	6 €	
M3	4000	4 €	
M4	1000	5 €	

- Determine the amount of each product grade to produce and the exact mix of materials in each grade such that weekly profit is maximized.
- Analyze the sensitivity report.